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EVALUATION OF WASTE DISPOSAL PRACTICES OF ALASKA SEAFOOD PROCESSORS

National Field Investigations Center

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Evaluations of waste disposal practices and treatment needs were made at 26 Alaskan seafood processing facilities. Water quality studies were conducted at 15 of these facilities in three geographical areas -- Bristol Bay, Alaska Peninsula, and Southeast Alaska. The results of this investigation indicated that scouring and dispersion by tides was the determining factor in the degree of treatment required. Dispersion is adequate to prevent deposits of discharged solids, and the water quality problems associated with such deposits, solids, where 1) outfalls are situated in fast-moving tidal areas, 2) outfalls are submerged below lower low water, and 3) the wastes are ground before discharge. Bottom deposits and resultant water quality problems were observed where wastes were discharged ground or unground in quiescent or shallow waters, on the beaches, or unground to tidal areas. Considering the enormous tidal volumes, the measurement of the dissolved oxygen was of no consequence.

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OFFICE OF ENFORCEMENT

EVALUATION OF
WASTE DISPOSAL PRACTICES OF
ALASKA SEAFOOD PROCESSORS

NATIONAL FIELD INVESTIGATIONS CENTER-DENVER
DENVER, COLORADO
AND
REGION X, SEATTLE, WASHINGTON

DECEMBER 1974

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GLOSSARY

BOD - biochemical oxygen demand, 5-day at 20°C

CFR - Code of Federal Regulations

cc - volume in cubic centimeters = 0.06102 in.^3 or 0.001 liter

cm - length in centimeters = 0.3937 in. or 0.03281 ft.

COD - chemical oxygen demand

°C - temperature in degrees Centigrade = 5/9 (°F -32)

DO - dissolved oxygen

ft - length in feet = 0.3048 meters

g - weight in grams = 2.205×10^{-3} pounds

gal. - volume in gallons = 3.785 liters

gph - flow rate in gallons per hour = 3.785 l/hr

gpm - flow rate in gallons per minute = 0.0631 liters per second

HTH - calcium hypochlorite

JTU - turbidity as measured in Jackson turbidity units

in. - length in inches = 2.54 centimeters

kg - weight in kilograms = 2.205 pounds

kkg - weight in thousand kilograms = 2205 pounds or 1 metric ton

km - distance in kilometers = 0.621 miles

kn - velocity in knots = 1.151 miles per hour or 1.852 kilometers per hour

l - volume in liters = 0.2642 gallons

lb - weight in pounds = 0.454 kilograms

lb/day - mass flow rate or load in pounds per day m - length in meters = 3.281 feet or 1.094 yards

m^3 - volume in cubic meters = 1.307 cubic yards or 264.2 gallons

m^3/day - flow rate in cubic meters per day = 264.2 gallons per day

mgd - flow rate in million gallons per day = 3,785 cubic meters per day

mg/l - concentration in milligrams per liter

ml - volume in milliliters = 0.001 liters or 1 cubic centimeter

MPN - most probable number

N - nitrogen

NH_3-N - ammonia as nitrogen

NO_2-N - nitrite as nitrogen

NO_3-N - nitrate as nitrogen

Org C - organic carbon

Org N - organic nitrogen

OSI - organic sediment index

pH - the logarithm (base 10) of the reciprocal of the hydrogen ion concentration given in standard units (su)

ppm - concentration in parts per million

ppt - concentration in parts per thousand

psi - pressure in pounds per square inch

TKN - total Kjeldahl nitrogen

Total P - total phosphorus

TSS or SS - total suspended solids or suspended solids

WWTP - wastewater treatment plant

I. INTRODUCTION

Background

Seafood processing is one of the major industries in Alaska. The number of facilities in operation (from 100 to 200 in recent years) varies widely from year to year as the expected commercial catch of fish and shellfish fluctuates. The 1973 catches were expected to be well below average in several areas with fewer than 100 plants in operation.

The major commercial fishery areas are along southern coastal regions of the state. Principal areas include Southeast Alaska, Prince William Sound, Kenai Peninsula, Kodiak Island, Alaska Peninsula, Bristol Bay, and the Aleutian Islands.

Salmon, crab, shrimp, and halibut are the most important fish and shellfish processed. Salmon, the most important seafood, are caught primarily in the areas of Bristol Bay, Alaska Peninsula, Kodiak Island, Prince William Sound and Southeast Alaska. On the average, the largest catch is landed in Southeast Alaska. Processing is limited to a one to two month period at most locations. Of the shellfish, king crab is the most important species; tanner (also known as snow or queen crab) and dungeness crab catches have become more important as king crab catches have declined in recent years. The largest catches of king crab are landed in the Aleutian Islands and Kodiak Harbor. The largest dungeness crab catches are processed in Prince William Sound and Southeast Alaska. West Coast catches of the small shrimp have increased substantially in recent years; the area of Kodiak Island processes the major portion of the catch while Alaska Peninsula and Southeast Alaska also process significant amounts. Crab and shrimp processing may extend over a three to six month period. Southeast Alaska processes the major portion of the halibut and miscellaneous fish catch.

A substantial portion of fish and shellfish is waste material, ranging from onethird of the whole salmon to as high as 75 to 85 percent for crab and shrimp. In some areas, part of the waste materials are recovered for byproducts, but in most cases all waste materials are discharged directly to adjacent waters. Some of the plants grind their wastes before discharge, but some dump whole wastes near shore and others barge whole wastes some distance offshore.

Water quality problems associated with seafood processing are a direct function of receiving water conditions. In areas with high tidal ranges and strong currents, waste materials are rapidly dispersed. In more quiescent waters, accumulations of waste materials result in sludge banks, shell piles, aesthetic problems and dissolved oxygen depressions. As a result of the intermittent operations, water quality problems may be only short-term with normal conditions returning soon after processing is discontinued.

Objectives

To determine the extent of water quality problems and provide information to support effluent limitations for the industrial waste permit program for the seafood industry in Alaska, the National Field Investigations Center-Denver (NFIC-D) was requested by EPA Region X to conduct a survey of 26 facilities in the Bristol Bay, Alaska Peninsula, Kenai Peninsula, and Southeastern Alaska areas. The study, conducted from June to August during the 1973 processing season, had the following objectives:

1. Compare the various methods of waste disposal practiced in different seafood processing operations.
2. Determine the effects on the marine environment resulting from waste discharges in the vicinity of seafood processing plants;
3. Determine the distribution patterns of solid wastes from seafood processing operations; and
4. Determine the degree of treatment needed to protect the receiving waters.

This report is a compilation of the results of the survey of the Alaska seafood industries investigated. Chapters II and III discuss the summary, conclusions, and recommendations. Chapter IV is a general description of the study area. Characteristics of the salmon, crab, and shrimp processing industries including processing procedures, waste disposal methods, and waste characteristics are discussed in Chapter V. Operational information, production data, waste loads, waste disposal practices, and receiving water characteristics for plants surveyed in 1973 are summarized in Chapter VI. To facilitate presentation of the survey results, the plants investigated are correlated alphabetically with the areas studied: Bristol Bay (A); Alaska Peninsula (B); Kenai Peninsula (C); and Southeast Alaska (D). Information found in the appendices includes the Alaska Water Quality Standards (App. A), effluent limitations rationale (App. B), effluent limitations guidelines for the canned and preserved seafood category (App. C), a discussion of Vibrio (App. D), and materials and methods used during the survey (App. E).

II. SUMMARY AND CONCLUSIONS

Evaluations of waste disposal practices and treatment needs were made at 26 Alaskan seafood processing facilities. Water quality studies were conducted at 15 of these facilities in three geographical areas -- Bristol Bay, Alaska Peninsula, and Southeast Alaska.

The results of this investigation indicated that scouring and dispersion by tides was the determining factor in the degree of treatment required. Dispersion is adequate to prevent deposits of discharged solids, and the water quality problems associated with such deposits, where 1) outfalls are situated in fast-moving tidal areas, 2) outfalls are submerged below lower low water, and 3) the wastes are ground before discharge. Bottom deposits and resultant water quality problems were observed where wastes were discharged ground or unground in quiescent or shallow waters, on the beaches, or unground to tidal areas. Considering the enormous tidal volumes, the measurement of the dissolved oxygen was of no consequence.

These conclusions are supported, in part, by the Organic Sediment Index (OSI) that reflects the amount of decomposable organic material present in the sediment. OSI values less than 0.5 indicate inorganic or stable organic material; values ranging between 0.5 to 1 indicate that the sediment contains partially stabilized material; values between 1 and 5 indicate decomposing wastes; and values greater than 5 signify extremely active decomposition. Table II-1 lists the processors, OSI values, and disposal methods used.

Domestic waste disposal practices are inadequate at many of the facilities. The wastes are discharged directly to the receiving streams, to septic tanks without leach fields, or to municipal sewers which either have inoperative treatment facilities or no treatment facilities.

TABLE II-1

SEAFOOD WASTE DISPOSAL TECHNIQUES

Processor	Location	Product	Disposal Technique	OSI	Remarks
A. Briston Bay Area					
Bumble Bee Seafoods	So. Naknek	Salmon	Discharged unground through floors directly to beach.	1.40-2.03	Fish wastes still present under dock 48 hr after processing ceased.
Columbia Wards Fisheries	Ekuk	Salmon	Ground and discharged above high tide water surface.	2.17-3.43	Solids deposits evident at all discharge locations.
Melbro Packing Co.	Naknek	Salmon	Ground and discharged to tidal flat above low mean tide.	0.6-8.04	Solids accumulation during low tide. Visible waste plume during high tide.
Nushagak Fisherman, Inc.	Dillingham	Salmon Bottom Fish Crab	Ground and discharged above low mean tide.	0.25	Discharge pipe should be extended to lower low water.
Peter Pan Seafoods, Inc.	Dillingham	Salmon	Ground and discharged below low mean tide.	0.025-0.19	Small waste plume visible but dissipated quickly.
B. Alaska Peninsula					
Alaska Packers Assn., Inc.	Chignik	Salmon	Gurry scow towed into bay and dumped.	0.04-0.49	Tides float wastes back to cannery; deposits in creek behind facility. Odor problems after end of season.
Peter Pan Seafoods, Inc.	False Pass	Salmon	Discharged unground through floors and at dock face.	3.12	Wastes accumulated under the dock and along beach for 50 m.
Peter Pan Seafoods, Inc.	King Cove	Salmon Crab	Gurry scow towed to deep water and dumped.	2.46-24.15	Area around scow discolored; crab wastes evident in discharge area.
Peter Pan Seafoods, Inc.	Squaw Harbor	Shrimp	Discharged unground through submerged outfall below low tide.	2.20-7.70	Deposits accumulated within several hundred meters of discharge had strong H_2S odor; large mats surfaced occasionally, giving off strong obnoxious odors.

TABLE II-1 (CONTINUED)

SEAFOOD WASTE DISPOSAL TECHNIQUES

Processor	Location	Product	Disposal Technique	OSI	Remarks
Wakefield Fisheries	Sand Point	Shrimp Crab	Salmon wastes discharged unground through submerged outfall below low mean tide. Crab wastes ground and discharged at dock face.	0.04-5.10	Shell fragments and crab wastes deposited in vicinity of dock.
C. Kenai Peninsula					
Alaska Seafoods, Inc.	Homer	Salmon Shrimp Crab	Ground and discharged through submerged outfall at 3 ft minus tide level.	N/A[a]	Tidal currents cleanse the area; solids do not accumulate.
Columbia Wards Fisheries	Kenai	Salmon	Discharged unground above water surface at dock face.	N/A	Solid deposits not evident.
Kenai Salmon Packing Co.	Kenai	Salmon	Discharged unground through submerged outfall below low mean tide.	N/A	Solid deposits not evident.
Whitney-Fidalgo Seafoods, Inc.	Anchorage	Salmon	Discharged ground to Ship Creek above water surface.	N/A	Wastes accumulate on creek bank and bed; solid deposits next to dock.
D. Southeast Alaska					
Alaska Glacier Seafood Co.	Petersburg	Shrimp Crab	Ground and discharged below lower low water at dock face (area of poor dispersion).	4.18	Solid deposits dispersed with a fishing boat.
Annette Island Packing Co.	Metlakatla	Salmon	Discharged unground above water surface.	N/A	Solids visible on water surface 90 m from the dock.

TABLE II-1 (CONTINUED)

SEAFOOD WASTE DISPOSAL TECHNIQUES

Processor	Location	Product	Disposal Technique	OST	Remarks
Coastal Glacier Seafoods	Hoonah	Crab	Discharge unground through floors to water below and discharged ground at dock face.	0.002-0.32	Solids accumulation below grinder and under facility. Sediment at discharge location entirely crab waste.
E. C. Phillips & Son, Inc.	Ketchikan	Salmon Halibut Cod Herring	Ground and discharged through floor.	N/A	Floating solids under dock.
New England Fish Co.	Chatham	Salmon	Ground and discharged through submerged outfall below low mean tide.	0.007-0.2	Disposal adequate.
New England Fish Co.	Ketchikan	Salmon Halibut	Discharged unground through floor to water below.	N/A	Floating solids under dock.
New England Fish-Fidalgo Packing Co.	Ketchikan	Salmon	Discharged unground through submerged outfall below low mean tide.	N/A	Pumping of solids reduces particle size; adequate disposal.
Petersburg Fisheries, Inc.	Petersburg	Salmon	Discharged unground through floors and through submerged outfall.	0.03-0.39	Floating solids and foam in dock vicinity.
Petersburg Processors, Inc.	Petersburg	Salmon	Discharged unground through outfall under dock.	N/A	Floating solids under dock; water discolored.
Thompson Fish Co.	Hoonah	Salmon Halibut	Discharged unground to bay.	N/A	Fish cleaned by fisherman before delivery to facility.
Wards Cove Packing Co.	Ketchikan	Salmon	Discharged unground through submerged outfall below low mean tide.	N/A	Floating solids and scum observed near outfall.
Whitney-Fidalgo Seafoods, Inc.	Petersburg	Salmon	Ground and discharged through submerged outfall below low mean tide.	0.03-0.39	Disposal adequate.

a/ N/A - Not applicable, study not made.

III. RECOMMENDATIONS

The surveys conducted at 26 processors from June to August 1973 indicated that scouring and dispersion by the tides in the area of waste discharge are the primary factors in determining the degree of process waste treatment that is required. At those plants where the wastes are discharged into fast moving tidal areas at a point submerged below lower low water, dispersion was generally adequate to prevent solids buildup and water quality degradation. At plants where the discharge location was not so situated, bottom deposits and/or aesthetic problems were observed and, with few exceptions, were associatad with degraded water quality conditions such as depressed dissolved oxygen levels and floating solids. Recommendations for disposal of process wastes are based on these conditions.

Treatment of sanitary wastes requires the wastes 1) to be totally contained (septic tank with no discharge to surface waters), or 2) to receive secondary treatment (as defined by 40 CFR 133) either in a company operated treatment facility or by discharge to a municipal treatment facility that is providing secondary treatment or that is on an approved compliance schedule.

It is recommended that the following requirements be contained in the permits issued to the 26 processing facilities evaluated in this study, and that they be applied to other seafood processors in Alaska where applicable.

SANITARY WASTE TREATMENT REQUIREMENTS

For those processors that discharge sanitary wastes directly to the receiving water, to a municipal sewer which discharges the wastes untreated, or to septic tanks or leech fields which subsequently discharge to the surface waters, the following permit conditions are recommended.

Initial Conditions

The permittee is authorized to discharge all sanitary wastes as presently practiced during the period beginning on the effective date of the permit and lasting through 1) 30 June 1976, if the permittee elects to provide secondary treatment by means other than connection to a municipal system, or 2) 30 June 1977, if the permittee elects to connect to a municipal system providing secondary treatment by 1 July 1977, or that is on an approved compliance schedule.

Final Conditions

If the permittee has not elected to convey by 30 June 1977 all sanitary wastes to a municipal treatment facility which provides secondary treatment or that is on an approved compliance schedule, then during the period beginning 1 July 1976, and lasting through the expiration date of the permit, all sanitary wastes shall 1) be totally contained, or 2) receive secondary treatment (40 CFR 133).

PROCESS WASTES

The method of process waste treatment and disposal is dependent upon plant location. Remote plants do not have access to landfills, and barging of screened wastes may not be justifiable due to dispersion characteristics of the receiving waters or to adverse geological and climatic conditions. In some instances, the wastes should be transported to an area of the receiving waters with good dispersion characteristics using a gurry scow, provided that the grid openings in the net or bottom of the scow are equivalent to a grid spacing of 1 mm (0.040 in.) or less. Screening of wastes with adequate disposal or resource recovery is achievable in non-remote areas. However, if the processors in the remote areas wish to screen the wastes, this option should be allowed in the permits.

The following permit conditions are recommended for the treatment and disposal of process wastes.

NON-REMOTE AREAS (SCREENING)

Initial Conditions

1. During the period beginning on the effective date of the permits and lasting through the expiration date, the processors are authorized to discharge cooling water, boiler water, freshwater pressure relief discharges, water used in live tanks, and water used in fluming fish as presently practiced.

2. During the period beginning on the effective date of the permits and lasting until the expiration date, the total daily average and daily maximum discharge flows shall be limited as shown in Table III-1 or to the flows reported in the RAPP applications. To comply with monitoring requirements, the discharge flow shall be considered as the total intake water entering the facility. The intake water shall be measured continuously with daily totals recorded.

3. During the period beginning on the effective date of the permits and lasting through 30 June 1977, the processors are authorized to discharge all process wastes. Process wastes do not include cooling water, boiler water, freshwater pressure relief discharges, water used in live tanks, or water used to transfer fish from fishing vessels to the facility. All process wastes shall be collected, discharged, disposed of, and monitored (during the operating season) by the processors as follows:

   a. All process wastes shall be collected, without loss through the facility floors, and flumed to a grinder(s).
   b. Particle size of all wastes shall be reduced to a diameter of 1.27 cm (0.5 in.) or less to insure adequate dispersion in the receiving water.
   c. Discharge shall be accomplished through an outfall(s) located beneath the receiving water surface at mean lower low water.

Final Conditions

1. During the period beginning 1 July 1977 and lasting through the expiration date of the permits, the processors are authorized to discharge process wastewater, after screening, through a single outfall or multiple outfalls. Process wastewaters do not include cooling water, boiler water, freshwater pressure relief discharges, water used in live tanks, and waters used to transfer fish from fishing vessels to the facility. Process wastes discharges shall be collected, disposed of, and monitored (during the operating season) by the processors as specified below:

TABLE III-1

FLOW LIMITATIONS FOR ALASKA SEAFOOD PROCESSORS[a/]

Processor	Daily Average		Daily Maximum	
	m^3/day	mgd	m^3/day	mgd
Nelbro @ Naknek	1,140	0.30	1,890	0.50
Bumble Bee @ Naknek	1,670	0.44	4,920	1.3
Columbia Ward @ Ekuk	492	0.13	1,590	0.42
Columbia Ward @ Kenai	537	0.142	2,200	0.58
Peter Pan @ Dillingham	1,060	0.28	1,060	0.28
Peter Pan @ False Pass	1,210	0.32	3,785	1.0
Peter Pan @ King Cove	1,893	(0.50)	1,893	(0.50)
Peter Pan @ Squaw Harbor	1,290	0.34	3,785	1.0
Wakefield @ Sand Point	681	0.18	10,220	2.7
Alaska Packers @ Chignik	1,500	0.40	4,500	1.2
Kenai Packers @ Kenai	1,360	0.36	2,720	0.72
Alaska Seafoods @ Homer	594	0.157	1,030	0.272
Whitney-Fidalgo @ Anchorage	303	0.08	3,030	0.8
Whitney-Fidalgo @ Petersburg	1,510	0.4	4,540	1.2
Petersburg Fisheries @ Petersburg	2,080	0.55	6,250	1.65
Petersburg Cold Storage	2,270	0.6	6,810	1.8
Petersburg Processors	590	0.156	1,180	0.312
Annette Island @ Metlakatla	2,390	0.63	2,390	0.63
Thompson Fish @ Hoonah	57	0.015	189	0.05
Coastal Glacier @ Hoonah	1,893	0.50	2,271	0.60
New England Fish @ Chatham	1,360	0.36	2,380	0.63
New England Fish @ Ketchikan	Not Available		Not Available	
Nefco-Fidalgo @ Ketchikan	Not Available		Not Available	
E. C. Phillips @ Ketchikan	163	0.043	163	0.043
Wards Cove @ Ketchikan	303	0.08	1,090	0.288
Nushagak @ Dillingham	57	0.015	76	0.020

[a/] Values were obtained from plant RAPP applications.

a. All wastes shall be collected, without loss through the facility floors, and flumed to a screening device(s) equivalent to an efficiently operated tangential screen with a grid spacing of 1 mm (0.040 in.) or less.

b. Process wastewaters passing through the screening device(s) shall be disposed of through an outfall or multiple outfalls located beneath the receiving water surface at lower low water. Flows shall be recorded, limited, and monitored as specified in the Initial Effluent Limitations. The quality of the discharge shall be monitored and recorded as specified below:

Effluent Characteristic	Frequency	Sample Type
BOD_5	Once/week	24 hr composite
Suspended Solids	Once/week	24 hr composite
Oil and Grease	Once/week	Grab

c. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per week.

d. Seafood processing waste materials which are retained on the screening device(s) shall be disposed of by 1) reduction, or 2) transport (without loss of solids) to a dumping site, which is within the baseline from which the territorial sea is measured as provided for in the Convention on the Territorial Sea and the Contiguous Zone (15 UST 1606; TIAS 5639), in at least 13 m (7 fathoms) depth and so as to not cause pollution or be a nuisance, or 3) other means approved by the Regional Administrator.

REMOTE AREAS (GRINDING OR GURRY SCOW)

Initial Conditions

1. During the period beginning on the effective date of this permit and lasting through 30 June 1975, the processors are authorized to discharge process wastewater, cooling water, boiler water, freshwater relief discharges, water used in live tanks, and water used in fluming fish as presently practiced.

2. During the period beginning on the effective date of this permit and lasting through the expiration date, the total daily average and daily maximum discharge flows shall be limited as shown in Table III-1 or to the flows reported in the RAPP applications. To comply with monitoring requirements, the discharge flow shall be considered as the total intake water entering the facility. The intake water shall be measured continuously with daily totals recorded.

Final Conditions (Grinding)

1. During the period beginning 1 July 1975, and lasting through the expiration date of the permits, the processors are authorized to discharge, dispose of, and monitor process wastes (during the operating season) as specified below: (Process wastes do not include cooling water, boiler water, freshwater pressure relief discharge, water used in live tanks, or water used to transfer fish from fishing vessels to the facility.)

   a. All wastes shall be collected, without loss through the facility floors, and flumed to a grinder(s).

   b. Particle size of all wastes shall be reduced to a diameter of 1.27 cm (0.5 in.) or less prior to discharge to ensure adequate dispersion in the receiving water.

   c. Discharge shall be accomplished through a single outfall or multiple outfalls located beneath the receiving water surface at least 13 m (7 fathoms) below mean lower low water.

   d. Self-monitoring shall consist of bottom cores collected at floor or ebb tide obtained from four locations within a 30 m (98 ft) radius of each outfall taken every two weeks beginning the first week of processing and ending the week after processing has ceased. Depth in centimeters of material identified visually, or by physical or chemical analysis, as seafood processing waste shall be reported once monthly. The four approximate locations for each outfall to be sampled are shown in Figure III-1. Flows shall be recorded, limited and monitored as specified in the Initial Effluent Limitations.

The processors may elect to use a grab sampler (dredge type) if no seafood wastes have accumulated at the sampling locations. Once material identified as seafood waste is observed, core samples must be taken to determine the depth of the accumulation.

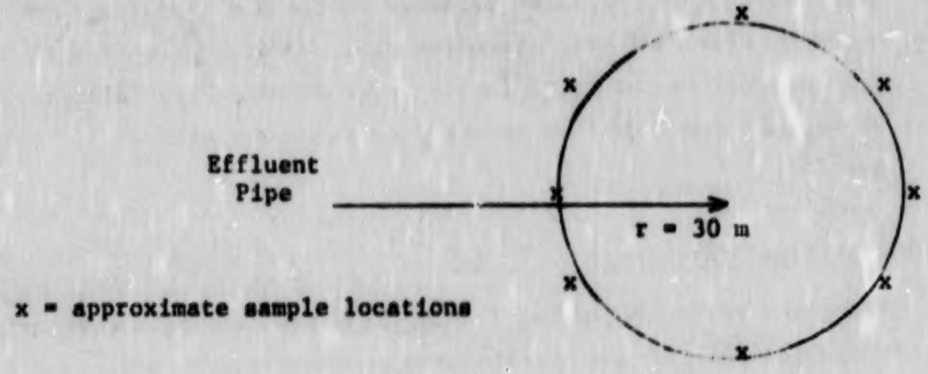

Figure III-1. Locations for outfall sampling.

e. If the required self-monitoring or such monitoring as is carried out by the EPA shows that more than one core sample in any fourteen-day period contains more than 7.5 cm (3 in.) depth of material identified as seafood processing waste, Requirement (f), below, shall be met no later than one year following the date of such determination.

f. Seafood processing waste materials which are retained on a screening device equivalent to an efficiently operated tangential screen with a grid spacing of 1 mm (0.040 in.) or less shall be removed from the process waste prior to discharge. Such solids shall be disposed of by 1) recovery, or 2) transport (without loss of solids) to a site within the baseline from which the territorial sea is measured as provided for in the Convention on the Territorial Sea and the Contiguous Zone (15 UST 1606; TIAS 5639), in at least 13 m (7 fathoms) depth and so as not to cause pollution or be a nuisance, or 3) other means approved by the Regional Administrator.

g. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per month before discharge through the submerged outfall.

2. During the period beginning 1 July 1975 and lasting through the expiration date of the permits, the processors are authorized to discharge as presently practiced, all cooling water, boiler water, freshwater pressure relief discharges, water used in live tanks, and water used to transfer fish from fishing vessels to the facility.

Final Conditions (Gurry Scow)

1. During the period beginning 1 July 1975, and lasting through the expiration date of the permits, the processors shall collect, dispose of, and monitor (during the operating season) process wastes as specified below: (Process wastewaters do not include cooling water, boiler water, freshwater pressure relief discharges, water used in live tanks, and water used to transfer fish from vessels to the facility.)

   a. All wastes shall be collected, without loss through the facility floors, and flumed to a screening device(s) (gurry scow) with a grid spacing of 1.27 cm (0.5 in.) or less. The wastes shall be collected in such a manner so as to not cause pollution or be a nuisance.

   b. Process wastewaters passing through the screening device(s) shall be disposed of as presently practiced.

   c. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per month.

   d. Seafood processing waste materials which are retained on the screening device(s) shall be disposed of by 1) recovery, or 2) transport (without loss of solids) to a site outside the baseline from which the territorial sea is measured as provided for in the Convention on the Territorial Sea and the Contiguous Zone (15 UST 1606; TIAS 5639), in at least 13 m (7 fathoms) depth and so as to not cause pollution or be a nuisance, or 3) other means approved by the Regional Administrator.

   e. Self-monitoring shall consist of bottom cores collected at flood or ebb tide obtained from four locations within a 30 m (98 ft) radius of each screening device taken every two weeks, beginning the first week of processing and ending the week after processing has ceased. Depth in centimeters of material identified visually, or by physical or chemical analysis, as seafood processing waste shall be reported once monthly. The four approximate locations for each screening device to be sampled are shown in Figure III-1.

      The processors may elect to use a grab sampler (dredge type) if no seafood wastes have accumulated at the sampling locations. Once material identified as seafood waste is observed, core samples must be taken to determine the depth of the accumulation.

   f. If the required self-monitoring or such monitoring as is carried out by EPA shows that more than one core sample in any fourteen-day period contains more than 7.5 cm (3 in.) depth of material identified as seafood processing waste, Requirement (g), below, shall be met.

g. Seafood processing waste materials which are retained on a screening device equivalent to an efficiently operated tangential screen with a grid spacing of 1 mm (0.040 in.) or less, shall be removed from the process waste prior to discharge. Such solids shall be disposed of by 1) recovery, or 2) transport (without loss of solids) to a site outside of baseline from which the territorial sea is measured as provided for in the Convention on the Territorial Sea and the Contiguous Zone (15 UST 1606; TIAS 5639), in at least 13 m (7 fathoms) depth and so as to not cause pollution or be a nuisance, or 3) other means approved by the Regional Administrator.

2. During the period beginning 1 July 1975 and lasting through the expiration date of the permits, the processors are authorized to discharge as presently practiced, all cooling water, boiler water, freshwater pressure relief discharges, water used in live tanks, and water used to transfer fish from fishing vessels to the facility.

IV. DESCRIPTION OF AREA

GEOGRAPHY

Alaska is a land of geographical extremes. With a land area of about 1,510,000 km^2 (586,400 mi^2), the state is about one-fifth the size of the conterminous United States and two and one-half times the size of Texas. Alaska contains the northernmost, easternmost and westernmost points in the United States.

With many coastal inlets and islands, Alaska has 51,500 km (32,000 mi) of coastland, (54 percent of the total U. S. coastland). The area of interest in the Alaska seafood industry study is the southern coastal area extending from British Columbia, Canada, west to the Aleutian Islands chain. This area, extending about 3,200 km (2,000 air mi), contains a major portion of the Alaska coastline.

A number of geographical features define characteristics of the coastal area [Figure IV-1]. Southeastern Alaska, or the Panhandle, is a long narrow coastal strip isolated from inland British Columbia by a mountain range with an average elevation of more than 2,800 m (9,000 ft). Numerous waterways divide much of the area into the islands of the Alexander Archipelago. Except for the high mountain areas covered with ice fields and glaciers, most of southeastern Alaska is heavily wooded with hemlock and spruce. Since land slopes are steep, little land area is available for building towns and cities, and most communities are strung out along shorelines. Roads are practically nonexistent outside developed communities. Principal cities are Juneau (the state capital), Ketchikan, Sitka, Petersburg and Wrangell.

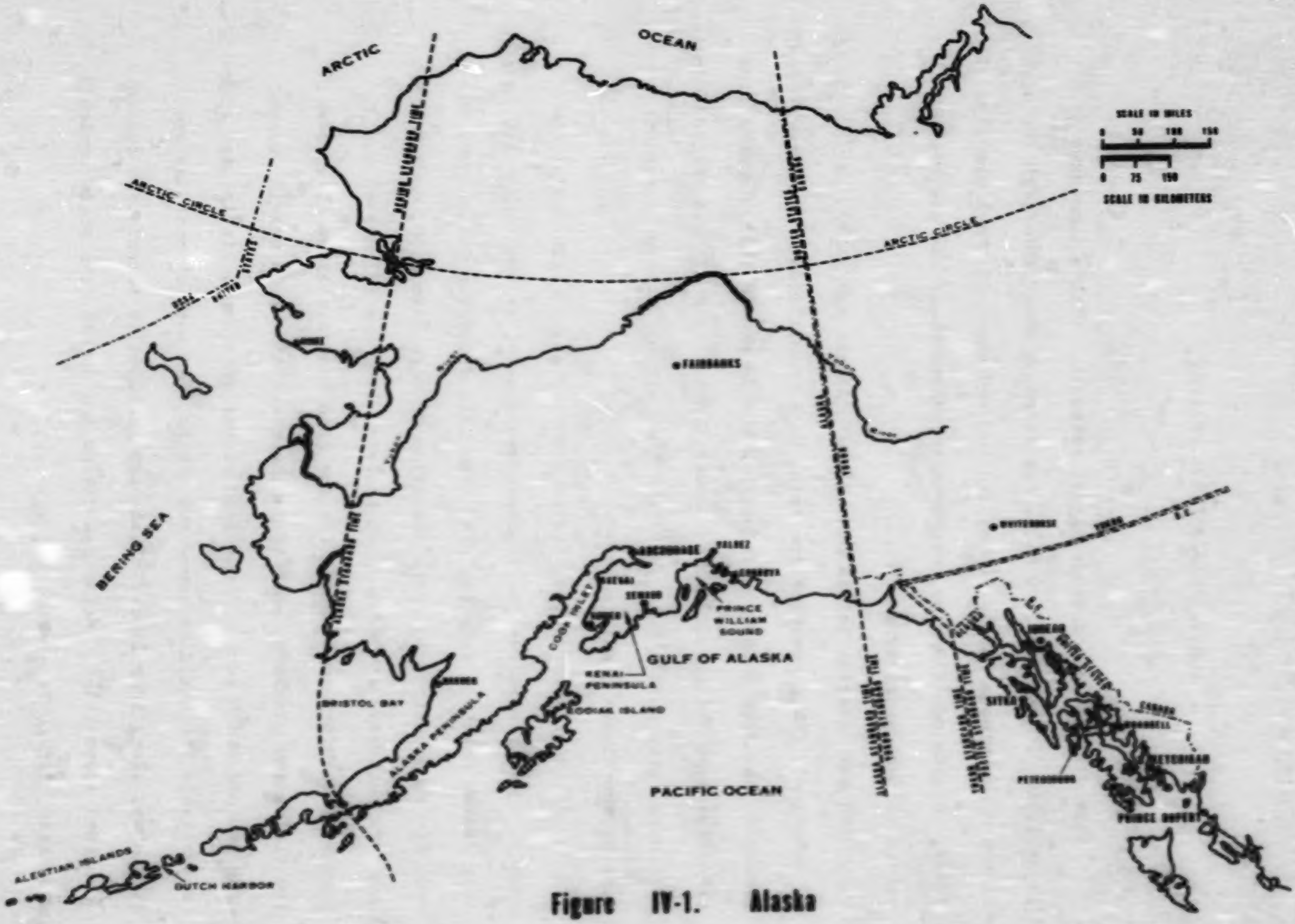
ARCTIC
OCEAN
SCALE IN MILES
0 50 100 150
0 75 150
SCALE IN KILOMETERS
ARCTIC CIRCLE
ARCTIC CIRCLE
FAIRBANKS
BERING SEA
WHITEHORSE
YUKON
B.C.
ANCHORAGE
VALDEZ
CORDOVA
KENAI
SEWARD
COOK INLET
PRINCE WILLIAM SOUND
GULF OF ALASKA
KENAI PENINSULA
KODIAK ISLAND
BRISTOL BAY
ALASKA PENINSULA
JUNEAU
SITKA
CANADA
WRANGELL
KETCHIKAN
PETERSBURG
PRINCE RUPERT
PACIFIC OCEAN
ALEUTIAN ISLANDS
DUTCH HARBOR

Figure IV-1. Alaska

Prince William Sound is southeast of Anchorage in southcentral Alaska. The Sound is surrounded by mountains and numerous narrow inlets. A number of islands partially protect the Sound from the Gulf of Alaska. Adjacent to the Sound are hemlock and spruce forests, while higher elevations are primarily mountain tundra and barrens. Cordova and Valdez are the principal cities in the area.

The Kenai Peninsula extends southward from Anchorage, separating Cook Inlet from the Gulf of Alaska. Mountainous terrain, the Peninsula is predominantly mountain tundra on the eastern slopes and spruce and birch forests on the western slopes. The Peninsula is the most accessible coastal area with highways connecting most communities to Anchorage. Principal communities are Seward, Kenai and Homer.

Kodiak Island, large and mountainous, is south of the Kenai Peninsula. Much of the island is mountain tundra with the north end supporting hemlock spruce forests. Kodiak is the only sizeable community on the island.

The Alaska Peninsula juts westward from the mainland, separating the Bering Sea from the Pacific Ocean. Large and shallow Bristol Bay is on the north side of the peninsula, bordered by low elevation tundra. Part of the peninsula is mountainous and covered mainly by mountain tundra. The Alaska Peninsula is quite remote, supporting only small fishing communities of which Naknek is of most interest.

The Aleutian Islands extend westward from the Alaska Peninsula about 1,600 km (1,000 mi). Largely uninhabited except for a few Aleut Indian villages and naval installations, the islands are barren and windswept.

CLIMATE

Temperatures in coastal Alaska are moderated by the influence of the sea and differ markedly from the extremes that occur in interior areas. Southeastern Alaska experiences mild weather year around, comparable to western Washington. The warm waters of the Japan current are responsible for this moderation. The warm current also has a beneficial effect on marine life, and commercial fishing flourishes.

In the Aleutian Islands temperatures rarely fall below -18°C (0°F), although fog and severe winds are common. Southcentral Alaska, including the Prince William Sound area and the Kenai Peninsula, experiences weather similar to upper New York State. Valdez is an ice-free port while Anchorage is landlocked by ice in winter. Average temperature ranges for the summer months are shown for several locations in Table IV-1.

TABLE IV-1

AVERAGE SUMMER TEMPERATURES (°F)[a]

	May		June		July		August	
City	Avg. Max.	Avg. Min.	Avg. Max.	Avg. Min.	Avg. Max.	Avg. Min.	Avg. Max.	Avg. Min.
Anchorage	54	38	63	43	65	50	63	48
Cordova	52	36	58	42	60	46	61	44
Juneau	54	38	61	44	63	48	62	47

[a] Temperature in degrees Centigrade = 0.556 (°F - 32).

Because it is near the sea, coastal Alaska receives heavy precipitation. Cloudy weather is the rule with rain two days out of three common in many areas. Southeastern Alaska receives the most rain with annual precipitation ranging from 2,540 mm (95 in.) at Juneau to more than 3,820 mm (150 in.) at Ketchikan. Other coastal areas receive lesser amounts although 1,520 mm (60 in.) is common. Fog occurs about 20 to 30 days per year.

The far north latitude causes long days in summer and long nights in winter. During midsummer in Anchorage, nights may be as short as four hours.

POPULATION AND ECONOMY

With a population of slightly more than 300,000, Alaska is the least populated of the 50 states. About 70 percent of the population lives in the coastal areas. Sizeable communities are widely scattered with most areas supporting only small fishing, mining or Indian villages. Many communities are populated only seasonally.

Anchorage, with a metropolitan area of about 125,000 people, has more than one-third of the state's population. All other coastal communities have less than 15,000 population. Cities of interest and their approximate area populations are: Kodiak, 9,000; Ketchikan, 7,000; Sitka, 7,000; Juneau, 6,500; Kenai, 3,500; Petersburg, 3,000; Homer, 3,000; Seward, 2,500; and Cordova, 2,000.

The economy of southeastern Alaska depends predominantly upon tourism and the lumber, pulp and paper, and fishing industries. Until recently the southcentral area economy rested upon fishing, mining, and tourism. Discoveries of oil in Cook Inlet have developed a petroleum industry which centers on petrochemical plants at Kenai. Valdez is the southern terminus of the proposed Alaska pipeline to transport oil from the new North Slope oil fields. The Alaska Peninsula and Aleutian Islands depend heavily upon fishing and tourism.

OCEANOGRAPHY

Tides in Alaska are markedly different from typical southern United States waters. The tides are semidiurnal with two highs and two lows daily. Tide ranges of 4 to 6 m (12 to 20 ft) are common. This high tidal range produces strong currents (2 to 9 kn) in many of the narrower tidal channels. In areas of interconnected tidal channels, such as in the southeast, tide stages strongly influence the direction of freshwater flow in such channels. In areas with large freshwater inflows, salinities may vary sharply with the tides. Water temperatures and other water quality parameters are also affected.*

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* The criteria covering water quality conditions in these estuarine areas are found in Appendix A.

V. PROCESSING SEAFOODS IN ALASKA

The EPA-NFIC-D survey concentrated on evaluating salmon, crab and shrimp processors in Bristol Bay, Alaska and Kenai Peninsulas, and southeast Alaska. Each processor was visited by EPA personnel. Plant officials were interviewed to obtain information on plant processing operations, production rates, water uses and the waste disposal practices employed. The findings of the evaluations of these facilities are discussed in greater detail in Section VI, "Evaluations of Alaska Seafood Processors, 1973."

The processing methods and waste disposal practices at most of the Alaskan plants are similar. In this section, the discussion deals with the general aspects of these practices for processing salmon, crab and shrimp.

SALMON

General

Five species of salmon are caught in Alaskan waters:

1. Chinook (*Oncorhynchus tschawytscha*), also known as king or spring salmon with an average fish weight of 9.1 kg (20 lb):
2. Sockeye (*O. nerka*), also known as red or blue-back with an average fish weight of 3.0 kg (6.5 lb):
3. Silver (*O. kisutch*), also known as coho or medium red with an average fish weight of 3.6 kg (8 lb);
4. Pink (*O. gorbuscha*), also known as humpback salmon with an average fish weight of about 1.8 kg (4 lb): and
5. Chum (*O. keta*), also called dog salmon with an average fish weight of about 3.6 kg (8 lb).

Sockeye, pink and chum salmon are the three major species that are caught and canned or fresh frozen. In the Bristol Bay area, all five species are caught but the sockeye salmon catch makes up 60 percent of the total production. In the Alaska Peninsula area, all three species are significant with sockeye, pink, and chum constituting 25 to 30, 40 to 45, and 30 to 35 percent, respectively, of the salmon production. The catch in the Kenai Peninsula area is predominantly sockeye salmon. In southeastern Alaska, pink salmon make up 70 to 80 percent of the production; chum salmon make up the major portion of the remaining catch.

Commercial fishing is regulated by escapement. The Alaska Fish and Game Department operates counting stations on the major spawning streams. Fishing areas are opened or closed depending on the number of fish passing a counting station. If the number of salmon fall below prescribed levels, fishing is temporarily or permanently suspended.

Salmon catches in the aforementioned four areas were considerably less during the 1973 season than in previous years. In the Bristol Bay area, for example, the 1973 season was the worst in history. The 1973 forecast, based on the 1972 catch, was for an estimated catch of 6 million sockeye salmon, but the actual catch was only 2.3 million. The present plan of the Alaska Fish and Game Department is to close the Bristol Bay area to all salmon fishing in 1974. The primary cause for the reduced catch was the extremely cold winters in 1970-71 and 1971-72. This affected the food chain, caused heavier than normal ice packs on the ocean, froze salmon eggs in the spawning streams, and killed the immature fish or stunted their growth.[1/]

Process Operations

The majority of the Alaskan salmon are canned since the distance to markets precludes the sale of fresh salmon. However, numerous processors freshfreeze a portion of their catch, primarily for sale in the contiguous United States and Japan.

Because of the distance from fishing areas to the processing plants, salmon are generally delivered to the plants by cannery tenders that service a number of boats in a fishing area. The tenders use brine coolers or ice to cool the fish in transport. At the cannery the fish are off-loaded into an elevator and from there move onto a conveyor that carries them to the fish house. Figure V-1 is a schematic of the typical processing sequence. While unloading fish, small amounts of blood and slime are discharged to the receiving waters as drainage from the elevator and pumpage from the tender holds.

In the fish house the salmon are sorted by species into storage bins and cooled with ice or chilled brine. The fish can be taken immediately from the bins to the butchering sequence or can be held for processing at a later time.

Fish are transported via conveyor or by sluicing with saltwater to the butchering area where they are aligned manually on a conveyor belt feeding an indexer which beheads the fish. The fish heads* are processed in a variety of ways:

1. Direct discharge as waste solids;

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* At some plants, the nape (fleshy portion right behind the head) is reclaimed for further processing.

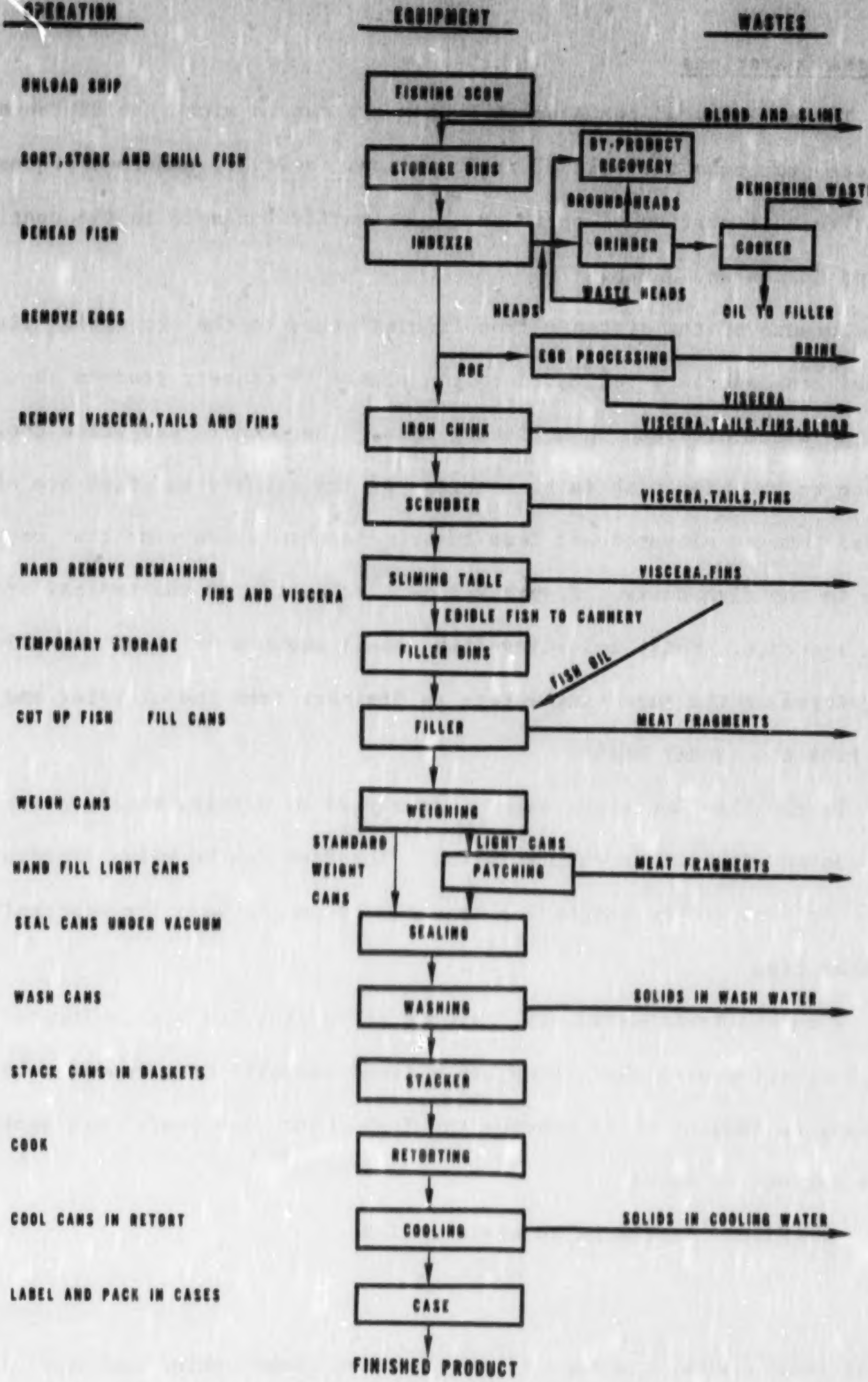
OPERATION
EQUIPMENT
WASTES
UNLOAD SHIP
FISHING SCOW
BLOOD AND SLIME
SORT, STORE AND CHILL FISH
STORAGE BINS
BY-PRODUCT RECOVERY
GROUND HEADS
RENDERING WASTE
BEHEAD FISH
INDEXER
GRINDER
COOKER
WASTE HEADS
HEADS
OIL TO FILLER
REMOVE EGGS
EGG PROCESSING
BRINE
ROE
VISCERA
REMOVE VISCERA, TAILS AND FINS
IRON CHINK
VISCERA, TAILS, FINS, BLOOD
SCRUBBER
VISCERA, TAILS, FINS
HAND REMOVE REMAINING FINS AND VISCERA
SLIMING TABLE
VISCERA, FINS
EDIBLE FISH TO CANNERY
TEMPORARY STORAGE
FILLER BINS
FISH OIL
CUT UP FISH FILL CANS
FILLER
MEAT FRAGMENTS
WEIGH CANS
WEIGHING
STANDARD WEIGHT CANS
LIGHT CANS
HAND FILL LIGHT CANS
PATCHING
MEAT FRAGMENTS
SEAL CANS UNDER VACUUM
SEALING
WASH CANS
WASHING
SOLIDS IN WASH WATER
STACK CANS IN BASKETS
STACKER
COOK
RETORTING
COOL CANS IN RETORT
COOLING
SOLIDS IN COOLING WATER
LABEL AND PACK IN CASES
CASE
FINISHED PRODUCT

Figure V-1 Salmon Processing Sequence

2. Freezing whole heads, or grinding, freezing and shipping to a byproducts plant; and

3. Cooking the whole or ground heads for oil that is added in the canning sequence to the 1/4- and, at some canneries, 1/2-lb cans. The standard procedure for processing fish heads is to cook them with steam at 100°C (212°F) for 15 minutes, then at 117°C (242°F) for 40 minutes at 12 psi. The pressure is then reduced, the cooker is opened, and cold water is added at the bottom to float the oil off the top.

After the indexer, the roe (eggs) is removed by hand and sluiced to the egg house. Some plants also recover the milt which is apparently marketed in Europe as a food spread. In the egg house, any viscera clinging to the eggs is removed by hand and sluiced to the waste stream or discharged. The eggs are cured in brine agitators before being hand-packed in salt for subsequent shipment, primarily to Japan (approximate weight is 10 kg or 22 lb per case after curing). The average weight of eggs recovered per case of salmon packed is:

0.7 to 0.9 kg (1.5 to 2 lb)/case of sockeye (reds),
1.1 kg (2.5 lb)/case of chums, and
2.3 kg (5 lb)/case of chinook (kings).

Following egg removal, the fish move into the iron chink (processing 120 fish per minute) where the viscera, tails and fins are removed and discharged as waste. Mechanical scrubbers are sometimes employed after the chink to remove additional waste parts. The fish are then moved onto sliming tables where any remaining viscera and other unedible parts are removed manually. The fish are also inspected for bruises and damage.

Subsequent to this step the fish are moved to filler bins for canning, which takes place in that portion of the plant known as the cannery.* Canning is usually done in 1/4-, 1/2- and 1-lb cans. Most canneries have three or more canning lines. One iron chink and butchering line can process fish for several canning lines. In some plants, salmon are also hand-packed in 4-lb cans for institutional use.

Fish move from filler bins to the filler machines which cut them into the proper sizes and force them into cans. Salt is then added to the cans and, as previously mentioned, reclaimed oil from the head cooker is added to the 1/4- and 1/2-lb cans. Meat fragments from the filling operation fall to the floor. In canneries with solid floors (such as concrete) these wastes are collected during washdown operations and discharged with other process wastes. In canneries with wooden floors the wastes generally fall through holes or cracks onto the beach below.

The filled cans are automatically weighted. Underweight cans are diverted to a patching area where they are manually brought to the proper weight by adding meat pieces. The cans are then sealed, coded, washed to remove exterior meat particles, then placed in metal baskets. The baskets are placed on carts and rolled into the retorts. Retorting at 12 psi and 117°C (242°F) takes eighty minutes for 1/2-lb cans and 95 minutes for 1-lb cans. After retorting, the cans pass through a water bath for cooling and washing to remove oil or fish particles (some canneries flood the retorts with the cooling water). Generally, the cans are labeled and mechanically cased (48 1-lb cans per case, or the equivalent for 1/2- and 1/4-lb cans), or are bright stacked and palletized for shipment. When bright stacked, cans are encased with cardboard or plastic for shipment to another location for labeling and packaging in standard cases.

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* In some plants, the egg house, the fish house, and the cannery are contained in one building; in others, they are in separate buildings.

Waste Characteristics

The major source of wastes in salmon processing is the butchering operation. About 33 percent of the whole fish is wasted with slight variation depending on the species. The head and the collar (nape) constitute 50 to 60 percent of that portion of the whole fish that is wasted. The following tabulation details the constituents of salmon processing wastes.

Percent of Total Salmon Cannery Waste by Species[2/]

Portion	Pink	Red	Chum	King	Coho
Head and collar	57	61	54	50	60
Tail and fins	16	14	11	11	11
Liver	5	5	5	3	[illegible]
Roe	8	9	16	15	8
Milt	5	5	6	4	6
Digestive tract	9	6	8	18	11
Heart	0.8	0.8	0.7	0.7	0.7

The heads and collars can be recovered as discussed previously. Other portions such as the tails, fins, and viscera can be utilized for byproducts. The roe and, at some canneries, the milt are recovered as standard practice.

Studies conducted on salmon processing wastes yielded the following information on selected parameters observed in the composite waste stream from a number of plants.

Typical Salmon Waste Characteristics[3/]

Parameter[a/]	Range
Flow (l/kg output)	4.2 - 14.6
Flow (gal./lb output)	0.5 - 1.75
BOD	900 - 5,400
COD	200 - 9,600
SS	500 - 4,800
Volatile Solids	1,000 - 7,300
Total Solids	1,100 - 8,400
Oil	60 - 350
Turbidity (JTU)	180 - 1,500
pH (su)	6.1 - 7.0

[a/] All units are mg/l unless otherwise indicated.

The values above include those plants with varying degrees of waste recovery and represent a combination of both dilute and concentrated waste streams from within the plants. For example, when different waste streams are evaluated individually, such as those from the sliming tables, iron chink, and head cookers, the various parameters have a much greater concentration range.

The pollutant load from a salmon processor will vary depending on the extent of byproduct recovery that is practiced. For a cannery discharging all of its wastes (no recovery of heads, etc.) the wet fish waste solids would average about 12 kg (26 lb) per case.* Where byproduct recovery is practiced (recovery of heads, tails, eggs, and milt), the wet fish waste load would be about 3.5 kg (8 lb) per case or about 70 percent less than when byproduct recovery is not practiced.

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[*] A case of salmon weighs 21.8 kg consisting of 48 one-lb cans. Live weight of fish processed per case varies from 30 to 34 kg (67 to 75 lb) per case. Typical salmon waste makeup is about 1/3 solids and 2/3 moisture.

Wastes from those canneries that discharge all processing waste solids contained BOD, COD, TSS, and oil loads of 2.8, 3.7, 2.6 and 0.5 kg (6.2, 8.1, 5.8, and 1.2 lb) per case, respectively. By comparison, at the other canneries, the BOD, COD, TSS, and oil loads were 0.6, 0.8, 0.4 and 0.04 kg (1.4, 1.8, 0.9, and 0.1 lb) per case, respectively.

Waste Disposal Methods

Waste treatment at most Alaska seafood processing plants is practically nonexistent. Disposal methods include the collection of all wastes at a central system and discharging at depth, direct discharge at the face of the dock, discharge to a gurry scow*, or discharge through the facility floor directly to the water or beach depending on the tide. Combinations of these methods are employed at some Alaska processing plants.

Discharge at the face of the dock can cause aesthetic problems when the water is shallow and tidal currents are weak. Foam and floating solids and a visible waste plume are evident when this method is used. Moreover, if the currents are not strong the solids tend to accumulate on the bottom and/or the beach. Disposal through an outfall discharging near the bottom into an area with better dispersal characteristics solves some of these problems. If the water is too shallow at the point of discharge, the wastewater, being less dense, tends to surface and create aesthetic problems with floating solids.

The gurry scow, depending on the mesh size of the net or the opening between the wood sides, will retain the larger fish solids. However, the wastes which escape while the scow is anchored at the dock are high in suspended solids and organics. The area around the scow becomes discolored: the extent of discoloration depends on the tidal action. The scows are towed out into the bays generally about 0.4 to 0.8 km (1/4 to 1/2 mi) and dumped in water at least 28 m (90 ft) deep. These wastes, primarily large solids, sink below the water surface. Because the currents are usually strong in the dumping area, problems with floating solids or bottom accumulations are not generally evident.

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* A gurry scow is a barge with either a net bottom or slotted wood side which allows the smaller solids and liquid wastes to escape while retaining larger solids such as heads, tails, and fins. The scow is towed out to deep water and dumped.

Many of the salmon processing plants have solid floors (concrete or plywood covered with fiberglass) in the fish house where the major portion of the waste is generated. This facilitates wash-down operations and fluming the wastes to a central collection system. Numerous plants, however, have wooden floors in the canning area. Wastes from the filler machines, canning lines, and cleanup operations fall through holes or open spaces between the planks into the water or onto the beach. Concrete floors or other types of solid construction would eliminate this problem.

The waste solids that are discharged may be either whole or ground. Grinding the solids improves the dispersal in the receiving water: however, it also increases the amount of waste material in solution and, consequently, the BOD and COD are higher than when the solids are whole.

CRAB

General

Development of the crab processing industry in Alaska has occurred within the past 25 years with most of the growth occurring since 1960.

The major species processed is king crab (*Paralithodes camschatica*). Dungeness crab (*Cancer magister*), and tanner crab (*Chionecetes bairdii*) are also processed in significant numbers.

King crab processing is confined mainly to southwest Alaska (Aleutian Islands and the western portion of the Alaska Peninsula) and central Alaska (Kodiak Island and Cordova). King crab processing in southeast Alaska is minimal. The dungeness crab catch in this area, however, ranged from 905 to 1,810 kkg (2 to 4 million lb) annually during the 1962-69 period. Catches of dungeness crab in the central region were higher, ranging from 1,360 to 4,080 kkg (3 to 9 million lb) annually during this period. King crab processing reached a peak of 72,000 kkg (159 million lb) in 1966 but then declined to 27,000 kkg (59 million lb) by 1969; the reduction being attributed to over-harvesting. Because of this, more restrictive fishing regulations have been imposed. In the Aleutian Islands area, for example, the king crab season extends from 1 November to 15 February. In the Bering Sea area it lasts from 15 June to 31 March and in the area around the Alaska Peninsula (King Cove and Sand Point) the season begins 15 August and extends to 15 January or until 24,300 kkg (5.25 million lb) are caught, whichever comes first. These season limitations have lead to the development of tanner crab processing. The season for this species extends from 15 August to 1 August the following year. Total figures for crab production in Alaska were not computed for the past several years; however, the 1971 data for two processing plants (King Cove and Sand Point) show that over 2,300 kkg (5 million lb) were processed at each plant. The King Cove plant processes mainly king crab, whereas the Sand Point plant processes equal amounts of king and tanner crab.

Process Operations

All species of crab are caught in pots set on the ocean bottom and are transported live to the plant in holding tanks or storage vats. At the plant the crabs are off-loaded into steel bins and then placed immediately in live tanks through which seawater is pumped continuously. Any dead crabs taken from the boat or the live tanks are disposed of as waste solids.

Alaska crab are generally processed into one of four forms of finished product -- canned meat, frozen meat, sections and legs (sections being the body halves), and whole crab. Normally only dungeness crab are processed whole.

Processing details and wastes generated in preparing the finished products are shown in Figures V-2 and V-3. Butchering and cooking operations are common to all phases of crab processing, except whole crab preparation.

In the butchering process the carapace (shell covering the body) is removed by impaling the crab on a metal plate. This breaks the body in half, allowing the viscera to fall to the floor. The gills are removed next by use of a rotary brush or paddle wheel. The viscera, gills, and carapace are fed to a grinder for subsequent disposal. In some plants the gills are not removed until after the crab has been cooked.

Two cooking steps are employed at some plants -- a precook and a final cook. The precook step is designed to free the meat, rinse off residual blood and minimize the heat shock of the final cooking cycle. Precooking lasts from one to five minutes at a temperature of 60° to 66°C

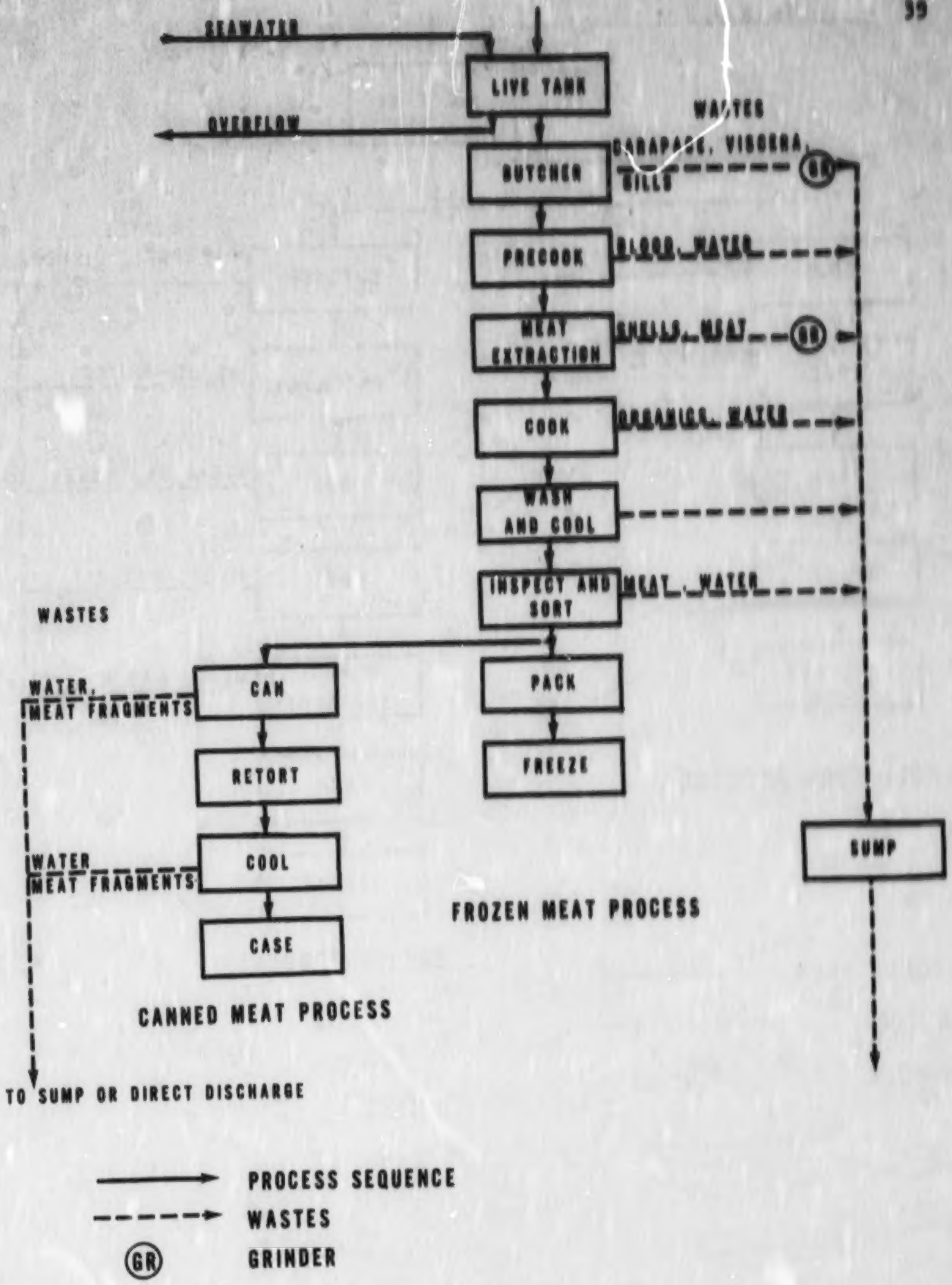
SEAWATER
LIVE TANK
OVERFLOW
WASTES
CARAPACE, VISCERA, GILLS
BUTCHER
GR
PRECOOK
BLOOD, WATER
MEAT EXTRACTION
SHELLS, MEAT
GR
COOK
ORGANICS, WATER
WASH AND COOL
INSPECT AND SORT
MEAT, WATER
PACK
FREEZE
SUMP
FROZEN MEAT PROCESS
WASTES
WATER, MEAT FRAGMENTS
CAN
RETORT
WATER MEAT FRAGMENTS
COOL
CASE
CANNED MEAT PROCESS
TO SUMP OR DIRECT DISCHARGE
PROCESS SEQUENCE
WASTES
GR
GRINDER

Figure V-2. Crab Processing Details, Frozen and Canned Meats

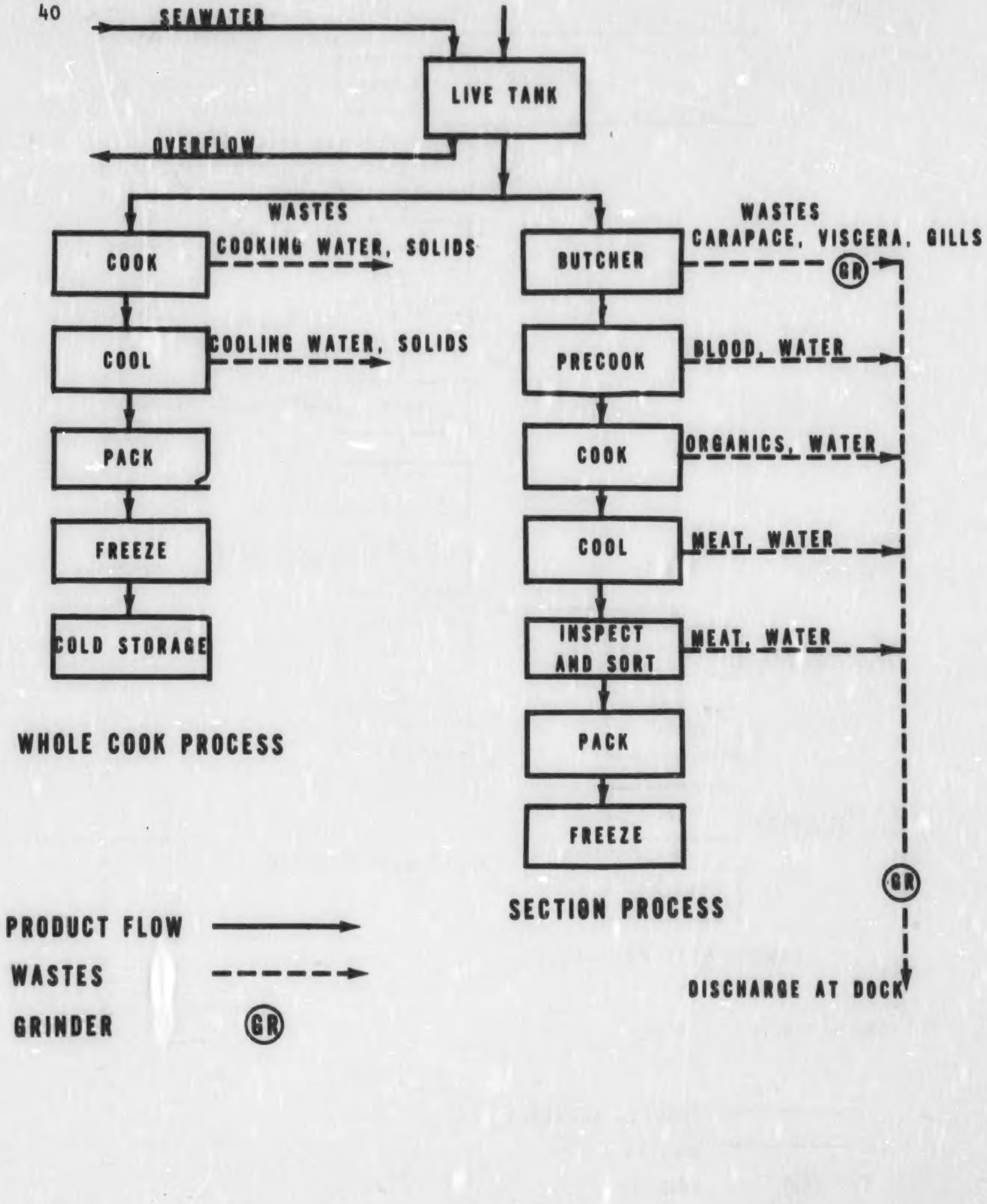
SEAWATER
LIVE TANK
OVERFLOW
WASTES
COOK
COOKING WATER, SOLIDS
COOL
COOLING WATER, SOLIDS
PACK
FREEZE
COLD STORAGE
WHOLE COOK PROCESS
WASTES
CARAPACE, VISCERA, GILLS
BUTCHER
GR
PRECOOK
BLOOD, WATER
COOK
ORGANICS, WATER
COOL
MEAT, WATER
INSPECT AND SORT
MEAT, WATER
PACK
FREEZE
GR
SECTION PROCESS
DISCHARGE AT DOCK
PRODUCT FLOW
WASTES
GRINDER
GR

Figure V-3. Crab Processing Details - Whole and Section

(140 to 150°F). The final or main cooking cycle is at about 99°C (210°F) for 10 to 20 min.[4/]

Frozen and canned meat preparation are similar. After butchering, the legs are separated from the shoulder. Precooking follows, after which the meat is removed from the claws and leg sections by a strong jet of water. (Some processors collect the claws for subsequent freezing and marketing as "Cocktail Claws.")[4/] Meat is often removed from the large leg sections and shoulders by extraction units that squeeze the meat from the shell. Meat is also removed by shaking the legs vigorously. Following the main cooking cycle and cooling, the meat is placed in a strong brine solution to aid the removal of shell fragments. The meat is then rinsed with freshwater to remove excess salts, detritus and any remaining shell. Prior to the freezing or canning process, the meat is inspected for any inedible material. Where freezing is to be employed the meat is packed in trays that hold 6.8 kg (15 lb) of meat. A saline solution or ascorbic acid may be added to each tray. The trays are frozen and glazed with a water spray, then boxed for subsequent shipment.

Canning proceeds in a manner similar to that used for processing salmon except that the cans are filled manually. The most common can size used is 1/2-lb. Salt and citric acid are added to each can after which they are sealed and retorted for 50 to 60 min at 116°C (240°F). Cooling can be accomplished in the retorts by flooding or processing the cans through a water bath. The cans are then cased (24 cans/case).

As mentioned earlier, dungeness crab are normally processed whole [Figure V-3]. Prior to cooking, the crabs are inspected for missing claws or legs. Cooking at 99°C (210°F) for 20 to 30 min may be done in freshwater or in a strong sodium chloride brine (50,000 to 60,000 mg/l as chloride); the latter cooking solution is used to impart a more desirable flavor to the crab.[4] After cooking, the whole crab is spray rinsed, cooled in freshwater, and placed in a brine freezer. Another rinsing with freshwater follows to remove excess brine and to glaze the crab which are then boxed and stored for shipment.

A common method of preparing king and tanner crab is by sectioning [Figure V-3]. Butchering proceeds in the same manner as that for the meat processes except that the legs and shoulders are left intact. After butchering, the crab halves are first rinsed in freshwater to remove residual blood. The next step is the precooking cycle at 60° to 70°C (140° to 160°F) for 2 to 5 min. The main cooking cycle is about 18 min at near boiling temperature which cooks the meat and inactivates the "bluing" enzyme that can cause the meat to turn blue during storage. Following the cooking cycle, the crab sections are rinsed, cooled, inspected, sorted by size and quality, and then packed in boxes. The boxes are then put in blast freezers or brine freezers. In brine freezing, it is common practice to pass the sections through a rinse tank to remove excess brine and to glaze the sections.

Waste Characteristics

Crab processing wastes consist of the inedible portions, such as shells, viscera, and gills, plus some meat fragments. The shell is primarily composed of chitin (a protein substance) and calcium carbonate.

The major portion of the raw (live) crab is wasted. When the whole crab is cooked, the wastes generated at the plant are minimal. When the meat is extracted from the shell for freezing or canning, however, the quantity of waste is generally 70 to 80 percent and, in some instances, as high as 88 percent of the raw weight. The high waste percentage generally occurs from processing king crab when the shoulder meat is not saved.

Water usage and the amount of wastes generated are the highest in the frozen and canned meat processes. Studies conducted at processors in Kodiak showed an average water use of 352 m^3/day (0.092 mgd) without waste grinding and 935 m^3/day (0.247 mgd) with waste grinding. Water use through a grinder has been reported as 170 to 225 liters/min (45 to 60 gal./min or 245 to 325 m^3/day). Most frozen and canned meat operations use two grinders. When grinding is not practiced, over half the water use occurs in the cooling and meat extraction steps. Where grinding is employed, over 60 percent of the water use occurs in the butchering and meat extraction steps. The highest-strength wastes are generated in the butchering and cooking steps. Table V-1 summarizes the values of selected parameters measured during a study of frozen and canned meat processors in Kodiak.[4/]

Water use in the crab section processing operation has been reported to be about 75 percent of that used for frozen and canned meat processes. The washing and cooling steps constitute 60 percent of the water use where grinding is not employed. With waste grinding, wastewater flows increase by about 50 percent (from about 260 m^3/day to 390 m^3/day). The washing, cooling, butchering and grinding steps comprise over 60 percent of the

TABLE V-1

SUMMARY OF SELECTED WASTE CHARACTERISTICS FOR FROZEN AND CANNED CRAB MEAT PROCESSES[d]

	WITHOUT GRINDING[a]						WITH GRINDING[b]					
	Mean			Range			Mean			Range		
Parameter	(mg/l)	(kg/kkg)[c]	(lb/ton)[c]	(mg/l)	(kg/kkg)	(lb/ton)	(mg/l)	(kg/kkg)	(lb/ton)	(mg/l)	(kg/kkg)	(lb/ton)
Screened Solids[d]	6,400	228	456	2,410-10,400	79-377	158-754	19,180	853	1,706	9,000-29,400	517-1,220	1,034-2,440
SS	340	11.8	23.6	205-476	6.7-17	13.4-34	1,158	54	108	661-1,630	45-67	90-134
BOD_5	363	12	24	250-415	8.4-15	16.8-30	1,434	66	132	656-2,160	54-69	108-138
COD	754	28	56	438-1,070	16-39	32-78	2,262	104	208	1,140-3,450	86-142	172-284
Organic N	77	2.7	5.4	54-100	1.8-3.6	3.6-7.2	230	10	20	86-754	8-13	16-26

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[a] Average of values obtained from one frozen and one canned meat processor — Avg. flow: 320 m^3/day (0.082 mgd); Range: 245-396 m^3/day (0.065-0.105 mgd).

[b] Average of values obtained from 4 plants in frozen and canned meat category — Avg. flow: 400 m^3/day (0.106 mgd); Range: 322-507 m^3/day (0.085-0.134 mgd).

[c] Wastes per unit of raw product.

[d] Samples were screened using a 20-mesh Tyler screen; retained solids were weighed.

total water use. A summary of waste load characteristics on selected parameters measured at several section processing Kodiak plants is shown in Table V-2.

In the whole crab process, water use is similar to that for the section process where grinding is not employed. The greatest portion of the water is used in cooling and rinsing operations. Organic wastes generated in the whole crab process are low with the majority coming from the cookers. Information on waste characteristics for this process is limited. Values reported for two plants (one sample from each) at Kodiak, Alaska are as follows:[4/]

Screened Solids	360-1,020 mg/l 11-18 kg/kkg
SS	58-65 mg/l 1-2 kg/kkg
BOD_5	280-790 mg/l 4.8-24 kg/kkg
COD	554-1,470 mg/l 9.6-44 kg/kkg
Organic N	33.2-104 mg/l 1.8-2 kg/kkg

Waste Disposal Methods

The common method employed in disposing of crab wastes is to grind and discharge at the face of the dock above the receiving water surface. In some cases the wastes are discharged just below the surface or are pumped through a closed conduit to discharge at depth (minimum of 7 fathoms). Foam and floating solids are generally visible in the area of the surface or near-surface discharges. Moreover, shells can accumulate on the bottom,

TABLE V-2

SUMMARY OF SELECTED WASTE CHARACTERISTICS FOR CRAB SECTION PROCESS[a]

	WITHOUT GRINDING[a]						WITH GRINDING[b]					
	Mean			Range			Mean			Range		
Parameter	(mg/l)	(kg/kkg)[c]	(lb/ton)[c]	(mg/l)	(kg/kkg)	(lb/ton)	(mg/l)	(kg/kkg)	(lb/ton)	(mg/l)	(kg/kkg)	(lb/ton)
Screened Solids[d]	1,440 1,560	25 24	50 48	720-2,040 480-2,400	14-43 7-35	28-86 14-70	13,900	307	614	807-27,000	28-474	56-948
SS	424 103	8 1.6	16 3.2	332-550 70-207	5-11 1.2-2.6	10-22	904	22	44	201-1,600	7-32	14-64
BOD_5	448 254	8 4	16 8	30-900 185-310	1-19 3-5	2-38 6-10	1,525	36	72	627-2,520	22-44	44-88
COD	1,090 415	19 13	38 26	900-1,400 280-600	13-30 9-15	26-60 18-30	2,620	64	128	954-4,540	34-80	68-160
Organic N	62.4 73	1.1 1.1	2.2 2.2	54.8-70.6 58-87	0.9-1.4 0.8-1.4	1.8-2.8 1.6-2.8	205	5	10	92-350	3.3-6.0	6.6-12

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a/ Taken from data compiled for tanner and king crab section processing. First value given for each parameter is for tanner crab section processing; the second is for king crab.

Avg. flow: 138 m^3/day (0.036 mgd); Range: 132-144 m^3/day (0.035-0.038 mgd).
Avg. flow: 318 m^3/day (0.082 mgd); Range: 284-356 m^3/day (0.075-0.094 mgd).

b/ Values from 4 plants investigated — Avg. flow: 330 m^3/day (0.088 mgd); Range: 156-439 m^3/day (0.041-0.116 mgd).
c/ Wastes per unit of raw product.
d/ Samples were screened using a 20-mesh Tyler screen; retained solids were weighed.

particularly where tidal action is not adequate to disperse them. Fine grinding of the shells tends to preclude the waste accumulations.

SHRIMP

General

The Alaska shrimp fishery has experienced rapid growth within the past 15 years, brought about by the introduction of mechanical peeling machines combined with the decline of the king crab fishery. Three species of shrimp are caught in Alaskan waters — the pink shrimp (*Pandalus borealis*), the side-stripe shrimp (*Pandalopsis dispar*), and the coon-stripe shrimp (*Pandalus hypsinotus*). Shrimp are processed throughout most of the year but the peak season extends from mid-June to mid-September.

The major portion of the shrimp catch is taken in the central region primarily at Kodiak. However, Squaw Harbor and Sand Point [Figure IV-1] are also major processing points. The shrimp caught in the central region increased from about 2,300 kkg (5 million lb) in 1964 to 21,000 kkg (46 million lb) in 1969. In the southeast region it has remained relatively stable, ranging between 900 and 1,800 kkg (2 and 4 million lb) per year.

Process Operations

Shrimp are generally processed by mechanical peeling. Only a few hand-picking processors exist in Alaska today. About 45 to 180 kg (100 to 400 lb) of raw shrimp can be hand peeled per day. The capacities of mechanical peelers vary between 1,820 to 5,450 kg (4,000 to 12,000 lb) per day.

Shrimp are either frozen or canned after processing. The processes involved and the wastes generated in canned and frozen shrimp operations are shown in Figure V-4.

Upon arrival at the plant, the shrimp are unloaded from the fishing boats, placed in storage carts and iced. Normally the shrimp have been on the fishing boat for up to several days. Because the optimum period for shrimp processing is about 3 days, the raw shrimp are generally stored for another 24 to 48 hr. At the time of unloading, fish that have been caught with the shrimp are manually removed.

At the time of processing, properly aged shrimp are conveyed to steam cookers which facilitate the peeling operation. This cooking operation lasts 1 to 2 min at 15 psi. Some plants, however, do not employ this cooking step and raw peeling is practiced. Seawater or freshwater is used to convey product, shells and heads from the peelers with the latter two going to waste. From the peelers, the shrimp move into washers where they are rigorously agitated to break loose any shell not previously removed. Following washing, the shrimp are flumed to separators where small meat fragments and any shell remaining are removed. After the separators, the shrimp are flumed to a dewatering belt. If the shrimp are canned, they are blanched in a salt solution for about 15 min at 96°C (205°F). Shrimp which are to be frozen are not generally subjected to this second cooking operation.

Following dewatering or blanching, as the case may be, the shrimp go to the packing area where they pass over an upflow blower which dries them and blows off extraneous shell. The shrimp then move onto a conveyor for

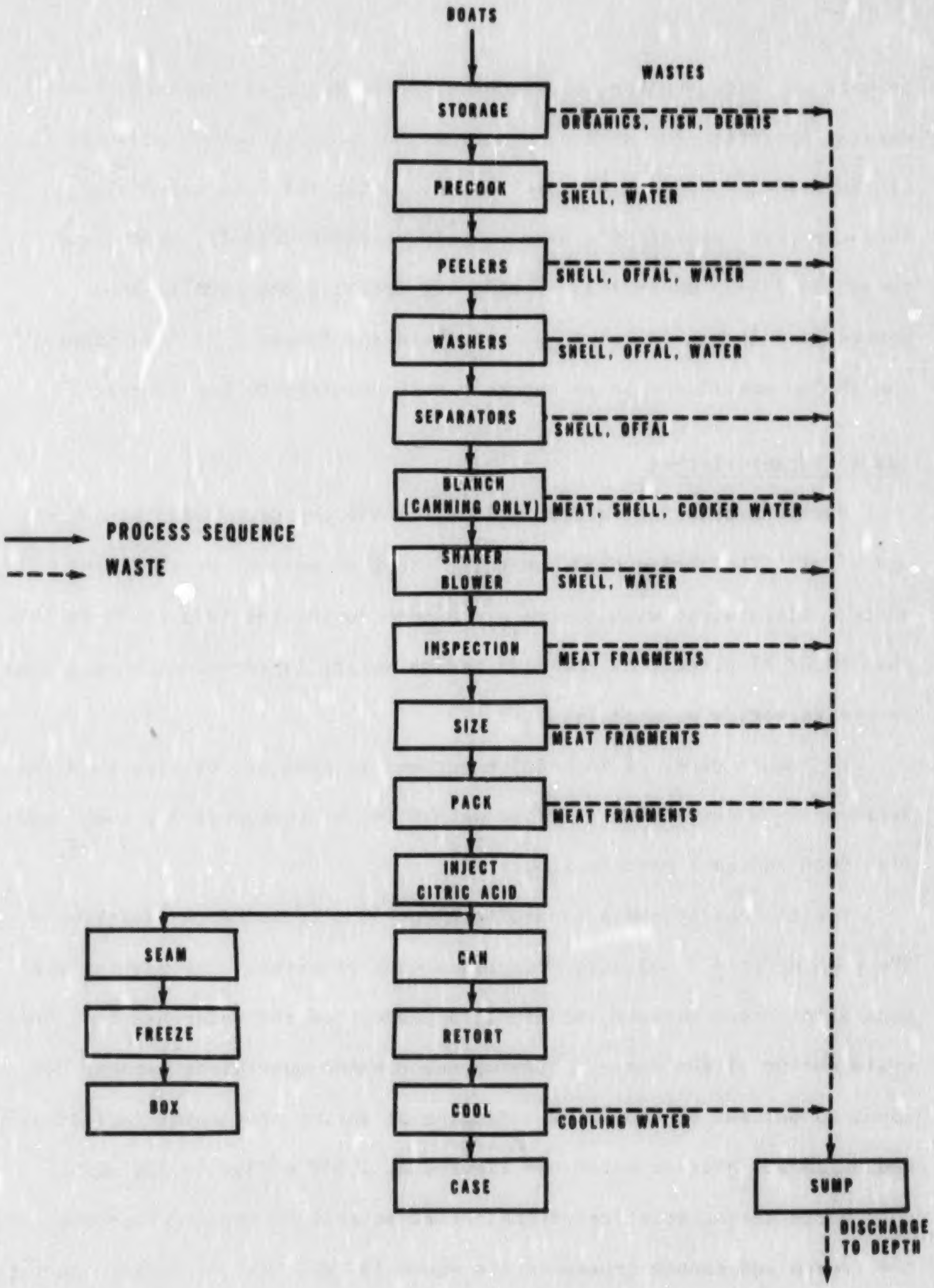

BOATS
WASTES
STORAGE
ORGANICS, FISH, DEBRIS
PRECOOK
SHELL, WATER
PEELERS
SHELL, OFFAL, WATER
WASHERS
SHELL, OFFAL, WATER
SEPARATORS
SHELL, OFFAL
BLANCH (CANNING ONLY)
MEAT, SHELL, COOKER WATER
PROCESS SEQUENCE
WASTE
SHAKER BLOWER
SHELL, WATER
INSPECTION
MEAT FRAGMENTS
SIZE
MEAT FRAGMENTS
PACK
MEAT FRAGMENTS
INJECT CITRIC ACID
SEAM
FREEZE
BOX
CAN
RETORT
COOL
COOLING WATER
CASE
SUMP
DISCHARGE TO DEPTH

Figure V-4. Shrimp Processing Sequence - Canned and Frozen Meat

inspection, size grading, and packing for freezing or canning. The canning operation for shrimp is similar to that for salmon and crab. Citric acid is added as a preservative. After the cans are sealed, they are then retorted for about 25 min at 116°C (240°F), cooled and cased (24 1/2-lb can/case). Shrimp for freezing are usually hand packed in 5-lb containers or plastic bags and frozen. In some plants, the shrimp are rinsed in an ascorbic acid solution before freezing.

Waste Characteristics

Shrimp processing wastes include soluble organics, shells, solids, and offal. The shrimp heads comprise about 45 percent of the total waste. Discussions with shrimp processors during the 1973 study indicated that about 15 percent of the live shrimp weight is recovered -- the amount recovered varies seasonally.

Byproduct recovery is being practiced in Alaska. Studies show that an average of 65 percent of the live weight can be recovered for such uses as fish food and as a protein supplement.

Peeling operations account for about 50 percent of the total water use. The peeling step is also the biggest source of waste. The washing and separation steps account for about 15 percent of the water use and a moderate amount of the waste. Fluming and cleanup operations account for about 25 percent of the water. Studies at shrimp processing facilities in Kodiak showed average water use figures of 1,340 m^3/day (0.356 mgd).[4]

Waste characteristics determined at several shrimp processors using the frozen and canned processes are shown in Table V-3. Studies conducted

TABLE V-3

SUMMARY OF WASTE CHARACTERISTICS FOR FROZEN AND CANNED SHRIMP PROCESSES[4]

	FROZEN PROCESS[a]						CANNED PROCESS[b]					
	Mean			Range			Mean			Range		
Parameter	(mg/l)	(kg/kkg)	(lb/ton)	(mg/l)	(kg/kkg)	(lb/ton)	(mg/l)	(kg/kkg)	(lb/ton)	(mg/l)	(kg/kkg)	(lb/ton)
Screened Solids[c]	5,200	670	1,340	3,500-6,800	420-990	840-1,980	10,400	760	1,520	3,120-18,800	205-1,240	410-2,480
SS	570	290	580	380-740	190-370	380-740	1,310	90	180	920-1,600	70-120	140-240
BOD_5	1,000	139	278	240-1,380	60-208	120-416	1,410	90	180	490-3,000	30-200	60-400
COD	1,740	283	566	960-2,640	159-363	312-726	2,940	196	392	1,370-5,780	130-408	206-816
Organic N	-	-	-	-	-	-	162	10.8	21.6	5-271	1.1-18.7	2.2-37.4

---

[a] This processor used seawater at an average rate of 1,620 m^3/day (0.430 mgd) and a range of 1,400 to 1,780 m^3/day (0.370 to 0.470 mgd). The peeler used was capable of processing 230 to 270 kg (500 to 600 lb)/hr. Eight samples were analyzed.

[b] This processor used freshwater at an average rate of 1,066 m^3/day (0.282 mgd) with a range of 700 to 1,438 m^3/day (0.185 to 0.380 mgd). Sixteen samples were analyzed.

[c] Wet weight.

by EPA indicated the COD and total dry solids of shrimp wastes have been estimated at 0.31 and 0.30 kg/kg, respectively.[5/]

Waste Disposal Methods

Discharge of wastes is generally made at the dock face above or below the water surface: or, in some cases, the wastes are conveyed through a closed conduit from the dock to deeper waters. Discharge of wastes at the dock face presents problems with foaming and floating solids. In either case, solids buildup around the discharge points can occur where tidal action is not sufficient to disperse the wastes.

VI. EVALUATIONS OF ALASKA SEAFOOD PROCESSORS, 1973

As previously mentioned, seafood processors were visited by EPA personnel during the period June to August in four selected areas of Alaska. These areas and the name, location, and seafood products processed at each facility are tabulated below.

BRISTOL BAY (FIGURE VI-1)

Seafood Processor	Location	Product
A-1 Bumble Bee Seafoods	South Naknek	Canned Salmon
A-2 Columbia Wards Fisheries	Ekuk	Canned Salmon Frozen Salmon
A-3 Nelbro Packing Company	Naknek	Canned Salmon
A-4 Nushagak Fisherman, Inc.	Dillingham	Frozen Salmon Frozen Herring Frozen Bottom Fish Frozen Tanner Crab
A-5 Peter Pan Seafoods, Inc.	Dillingham	Canned Salmon Frozen Salmon

ALASKA PENINSULA (FIGURE VI-1)

Seafood Processor	Location	Product
B-1 Alaska Packers Assn., Inc.	Chignik	Canned Salmon
B-2 Peter Pan Seafoods, Inc.	False Pass	Canned Salmon
B-3 Peter Pan Seafoods, Inc.	King Cove	Canned Salmon Canned Crab
B-4 Peter Pan Seafoods, Inc.	Squaw Harbor	Canned Shrimp
B-5 Wakefield Fisheries	Sand Point	Frozen Shrimp Frozen Crab

KENAI PENINSULA (FIGURE VI-2)

Seafood Processor	Location	Product
C-1 Alaska Seafoods, Inc.	Homer	Frozen Crab Frozen Shrimp Frozen Salmon
C-2 Columbia Wards Fisheries	Kenai	Canned Salmon Frozen Salmon
C-3 Kenai Salmon Packing Co.	Kenai	Frozen Salmon Canned Salmon
C-4 Whitney-Fidalgo Seafoods, Inc.	Anchorage	Frozen Salmon Canned Salmon

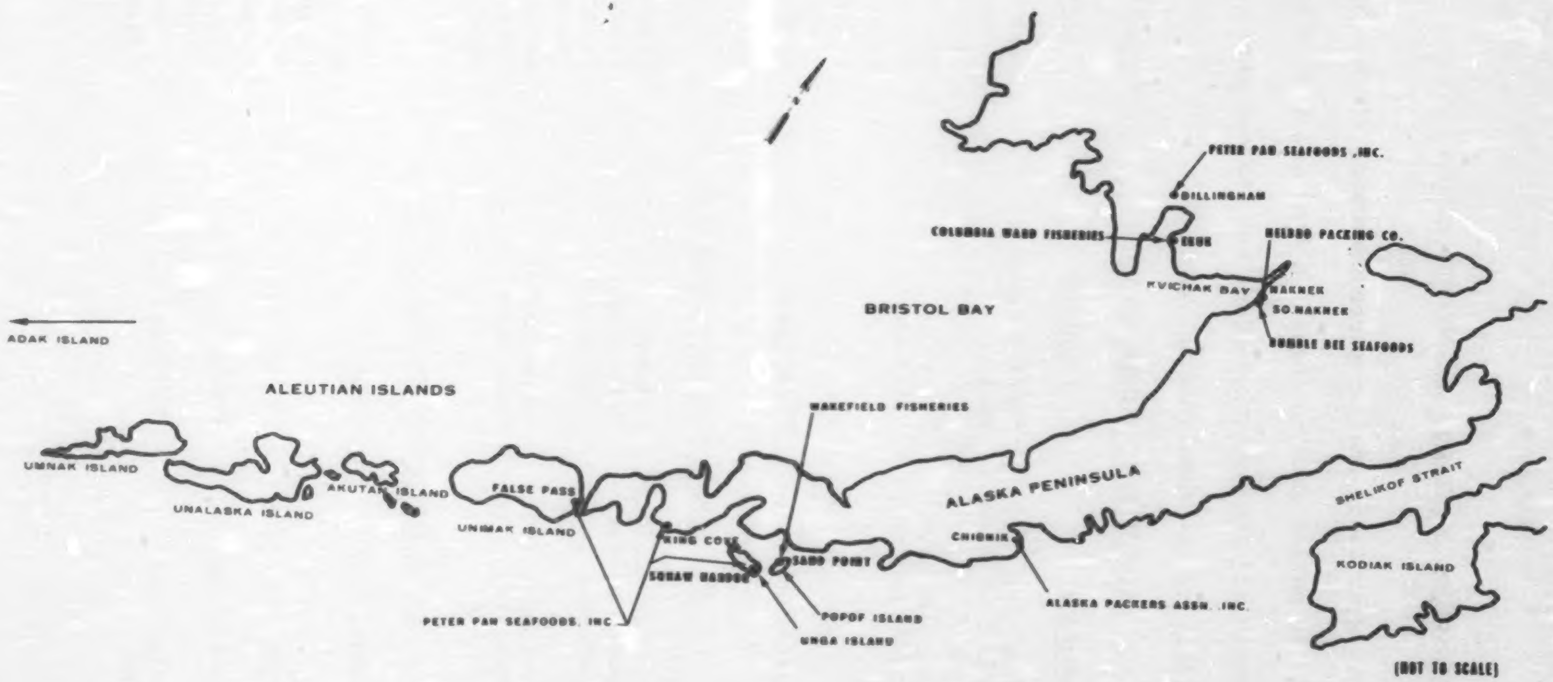
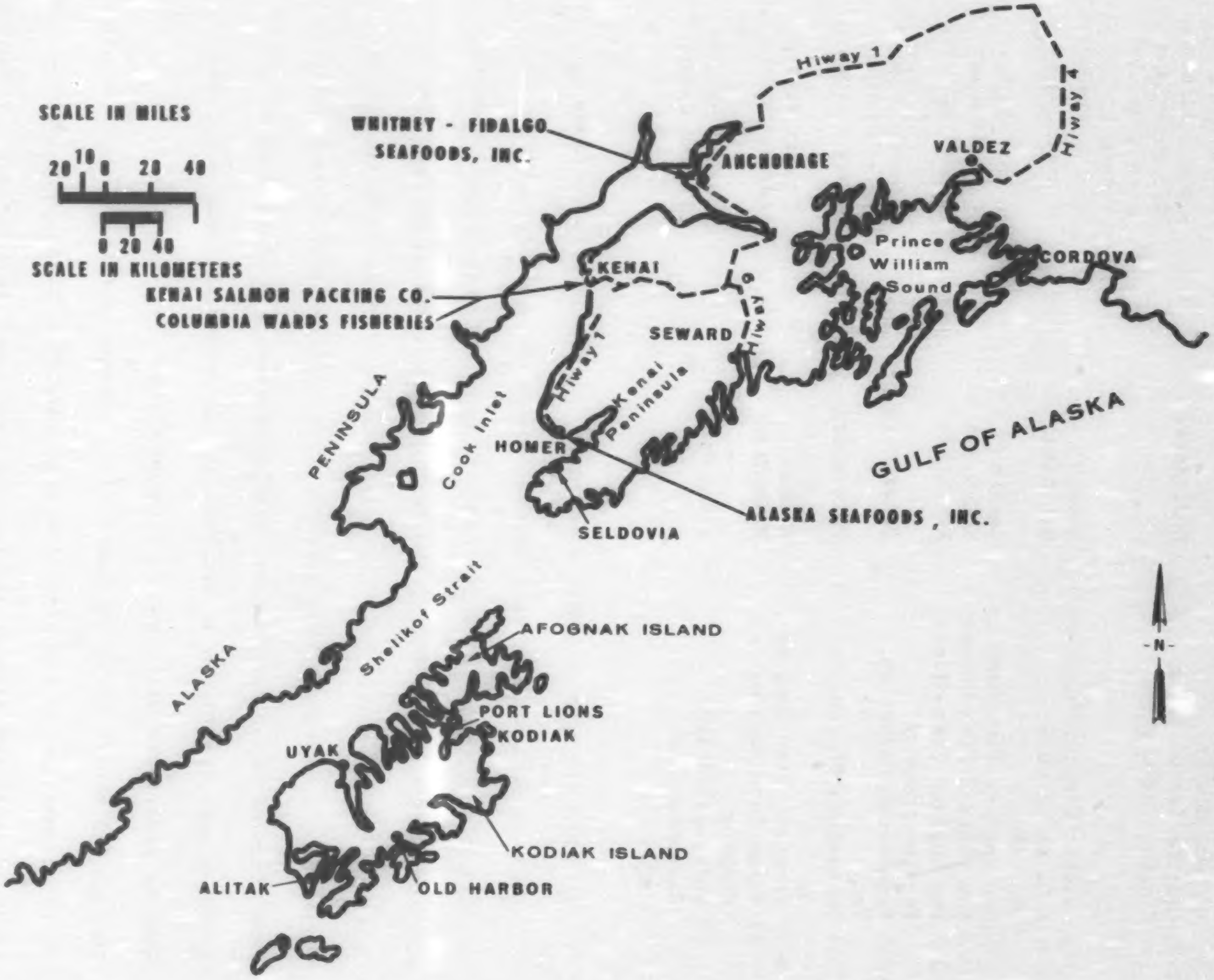

ADAK ISLAND
ALEUTIAN ISLANDS
UMNAK ISLAND
UNALASKA ISLAND
AKUTAN ISLAND
FALSE PASS
UNIMAK ISLAND
KING COVE
SQUAW HARBOR
SAND POINT
POPOF ISLAND
UNGA ISLAND
PETER PAN SEAFOODS, INC
WAKEFIELD FISHERIES
BRISTOL BAY
ALASKA PENINSULA
CHIGNIK
ALASKA PACKERS ASSN., INC.
PETER PAN SEAFOODS, INC.
DILLINGHAM
COLUMBIA WARD FISHERIES
EKUK
NELBRO PACKING CO.
KVICHAK BAY
NAKNEK
SO.NAKNEK
BUMBLE BEE SEAFOODS
SHELIKOF STRAIT
KODIAK ISLAND
(NOT TO SCALE)

Figure VI-1. Seafood Processing Plants Visited, Bristol Bay and Alaska Peninsula



SCALE IN MILES
20 10 0 20 40
0 20 40
SCALE IN KILOMETERS
WHITNEY - FIDALGO SEAFOODS, INC.
ANCHORAGE
Hiway 1
Hiway 4
VALDEZ
Prince William Sound
CORDOVA
KENAI
KENAI SALMON PACKING CO.
COLUMBIA WARDS FISHERIES
SEWARD
Hiway
Hiway 1
Kenai Peninsula
PENINSULA
Cook Inlet
HOMER
GULF OF ALASKA
SELDOVIA
ALASKA SEAFOODS, INC.
-N-
Shelikof Strait
AFOGNAK ISLAND
ALASKA
PORT LIONS
KODIAK
UYAK
KODIAK ISLAND
ALITAK
OLD HARBOR

Figure VI-2. Seafood Processing Plants Visited, Kenai Peninsula, Alaska

SOUTHEAST ALASKA (FIGURE VI-3)

D-1 Alaska Glacier Seafood Company	Petersburg	Frozen Shrimp Frozen Crab
D-2 Annette Island Packing Company	Metlakatla	Canned Salmon Frozen Salmon Frozen Halibut Frozen Cod
D-3 Coastal Glacier Seafoods	Hoonah	Frozen Crab
D-4 E.C. Phillips & Son, Inc.	Ketchikan	Frozen Salmon
D-5 New England Fish Company	Chatham	Canned Salmon
D-6 New England Fish Company	Ketchikan	Frozen Salmon
D-7 New England Fish-Fidalgo Packing Company	Ketchikan	Canned Salmon
D-8 Petersburg Fisheries, Inc.	Petersburg	Canned Salmon Frozen Salmon
D-9 Petersburg Processors, Inc.	Petersburg	Canned Salmon
D-10 Thompson Fish Company	Hoonah	Frozen Salmon
D-11 Wards Cove Packing Company	Ketchikan	Canned Salmon
D-12 Whitney-Fidalgo Seafoods, Inc.	Petersburg	Canned Salmon Frozen Salmon

A report on each of these processors follows in this section. Officials at each Company were interviewed to obtain information such as production rates, processing operations, water uses, types of waste, and waste disposal practices. Waste treatment needs to protect the receiving waters and to meet applicable state and Federal standards and regulations are also in this section. The remoteness of some processors from areas of major development, discharge area, and dispersion afforded by tides were considered in determining the treatment needs. For sanitary wastes, processors will have to provide adequate treatment by 30 June 1077 through (1) septic tanks and leach field systems proven to function properly, or (2) connection to a municipal system providing adequate secondary treatment (defined in 40 CFR 133) or one that is on a compliance schedule to achieve this end, or by 30 June 1976 if the processors install a secondary treatment system

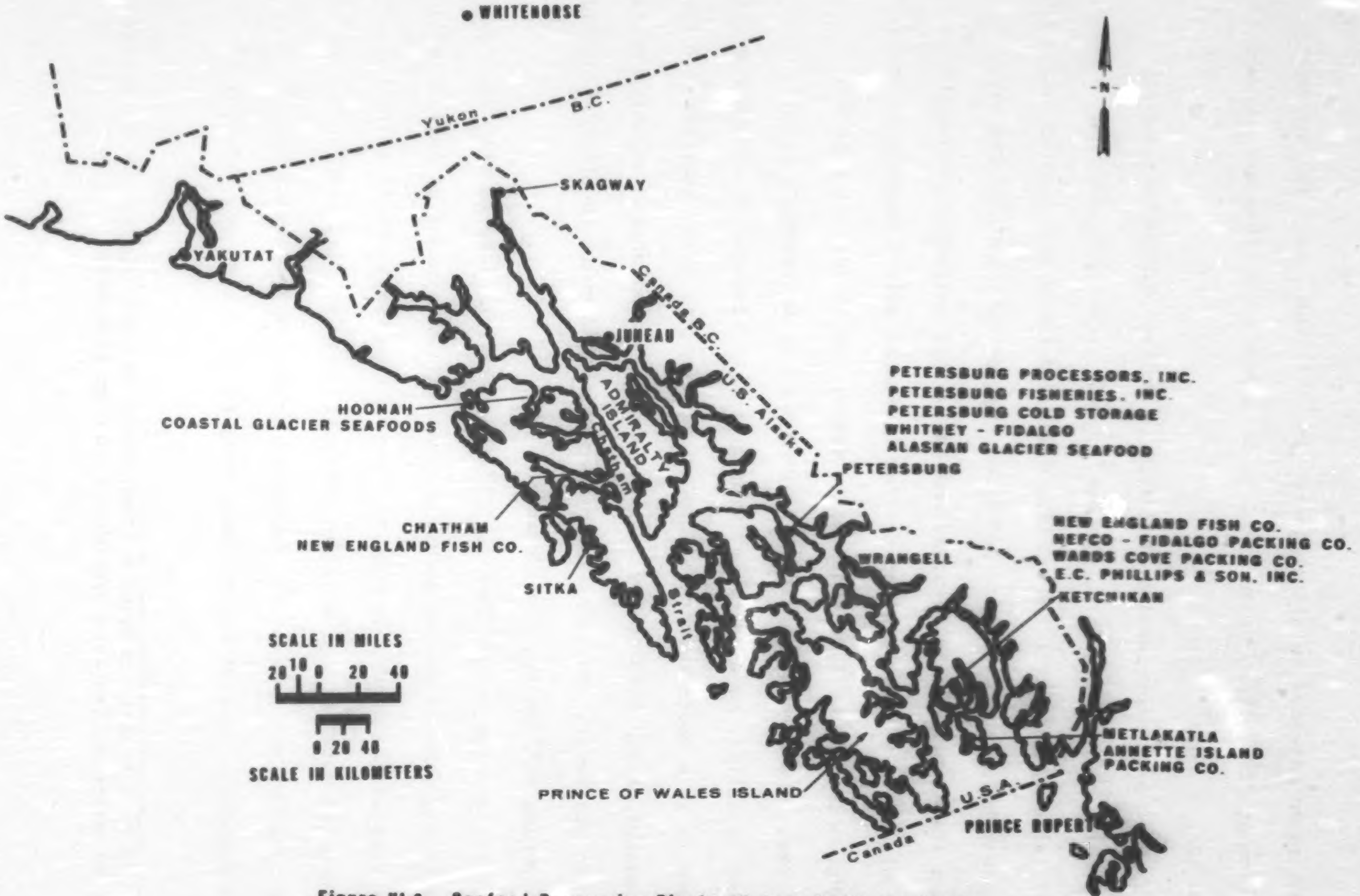

WHITEHORSE
N
Yukon
B.C.
SKAGWAY
YAKUTAT
Canada B.C.
U.S. Alaska
JUNEAU
ADMIRALTY ISLAND
Chatham
Strait
HOONAH
COASTAL GLACIER SEAFOODS
PETERSBURG PROCESSORS, INC.
PETERSBURG FISHERIES, INC.
PETERSBURG COLD STORAGE
WHITNEY - FIDALGO
ALASKAN GLACIER SEAFOOD
PETERSBURG
CHATHAM
NEW ENGLAND FISH CO.
WRANGELL
SITKA
NEW ENGLAND FISH CO.
NEFCO - FIDALGO PACKING CO.
WARDS COVE PACKING CO.
E.C. PHILLIPS & SON, INC.
KETCHIKAN
SCALE IN MILES
20 10 0 20 40
0 20 40
SCALE IN KILOMETERS
METLAKATLA
ANNETTE ISLAND
PACKING CO.
PRINCE OF WALES ISLAND
U.S.A.
Canada
PRINCE RUPERT

Figure VI-3. Seafood Processing Plants Visited, Southeast Alaska

such as an extended aeration plant. The effluent limits for secondary treatment of sanitary wastes will be in accord with those established by the EPA.

Most processors will be required to collect all process wastes including, where necessary, the head cooker liquor and wash down waters, and, after grinding of the solids, discharge the wastes through a closed conduit below low low tide, providing that at the point of discharge adequate dispersion is afforded and the solids buildup is minimized or precluded. If subsequent monitoring indicates solids buildup is occurring, screening will be required to remove the solids prior to discharge. The retained solids will then need to be transported, without loss of solids, to a suitable dumping area or disposed of by other means, such as in a waste reduction plant.* However, at those facilities where findings of the 1973 survey revealed solids accumulations on the beaches or in the water, and tidal influences were inadequate to afford dispersion, screening will be required immediately.

Monitoring in the form of collected sediment samples will be required routinely (one every two weeks) to ascertain the extent or lack of solids buildup in the discharge zone at those plants where, after grinding, the discharge goes through a closed circuit. Samples will need to be collected at flood or ebb tide in the discharge area at a sufficient number of points (4 minimum). Collection of these samples in an area described by a

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* In this report, reduction (rendering) is used to mean the conversion of waste solids into byproducts such as fish meal, pet food, and bait.

30 m (100 ft) radius from the discharge point should suffice. Data which needs to be recorded and subsequently reported monthly to the EPA includes the date, time, description of disposal area, depth of water, distance of sample point from the discharge point, tidal stage, person(s) collecting and analyzing samples, character of the samples as identified by visual or chemical analyses, and the depth of solids buildup.

Waste disposal requirements for the crab and shrimp processors will be in accord with the effluent limitations prescribed in the proposed guidelines [Appendices B and C].

A-1 BUMBLE BEE SEAFOODS, SOUTH NAKNEK, ALASKA

General

The Bumble Bee Seafoods, a subsidiary of Castle and Cooke of San Francisco, Cal. has been operating a salmon cannery on the Naknek River near South Naknek, Alaska [Figure VI-1] since 1938. The layout of the plant processing area is shown in Figure VI-A1. The cannery employed 190 fishermen, cannery workers, and miscellaneous personnel during the canning season that lasted from 22 June to 20 July 1973. The 1973 projected plant production was 60,000 to 70,000 cases* of which 98 percent were sockeye, two percent were chum, and less than one percent were chinook salmon. The annual production for the last five years at the South Naknek Bumble Bee cannery was as follows:

1972	70,000 cases
1971	74,000 cases
1970	132,000 cases
1969	50,000 cases
1968	40,000 cases

Because of a reduced salmon catch, caused by decreased runs and altered fishing regulations imposed by regulatory agencies, not all of the canneries in the area could operate economically during the 1973 season. Combines, in which one cannery processed fish for other canneries, were formed. The Bumble Bee cannery packed salmon for Alaska Packers, Columbia Wards Fisheries, and the Red Salmon Company, in addition to processing its own fish.

A Refuse Act Permit Program (RAPP) application was filed with the Corps of Engineers on 18 February 1972. EPA personnel from the National

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* One case consists of 21.8 kg (48 lb) of salmon.

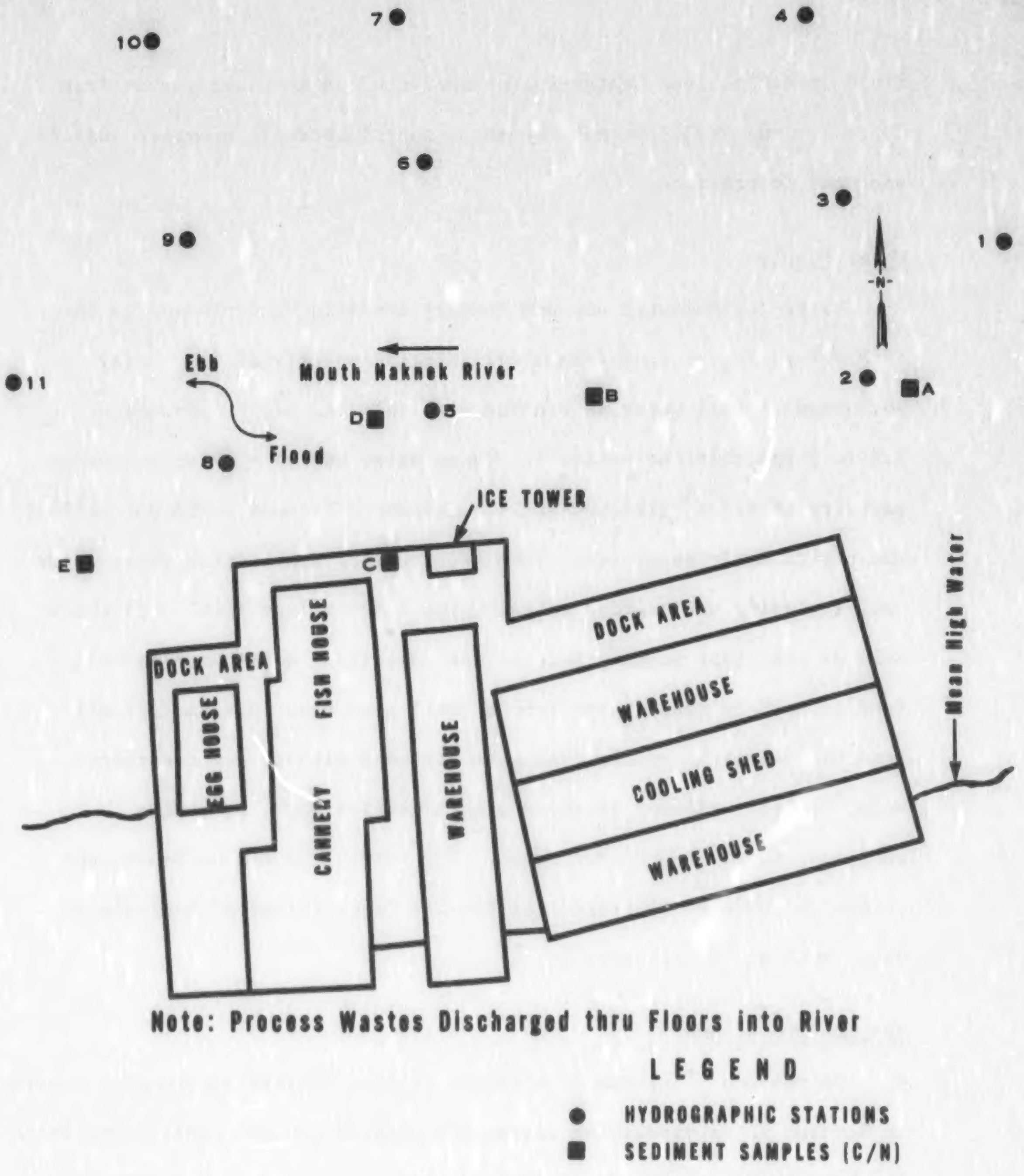
10
7
4
6
3
9
1
-N-
Ebb
Mouth Naknek River
11
2
A
B
D
5
Flood
8
ICE TOWER
E
C
DOCK AREA
FISH HOUSE
DOCK AREA
EGG HOUSE
CANNERY
WAREHOUSE
WAREHOUSE
COOLING SHED
WAREHOUSE
Mean High Water
Note: Process Wastes Discharged thru Floors into River
LEGEND
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)

Figure VI–A1. Bumble Bee Seafoods, South Naknek, Alaska
Plant Layout - Station Locations

Field Investigations Center-Denver conducted an in-plant survey from 28 to 30 June 1973. Warner Leonardo, superintendent, provided assistance and information.

Water Supply

Water for domestic use and cannery operations, excluding boiler feed water, is obtained from a well with a capacity of 910 m^3/day (0.24 mgd). Well water is treated with chlorine gas to produce a 1.5 to 2 ppm chlorine residual. Three water towers provide a storage capacity of 473 m^3 (125,000 gal.). Company officials could not estimate the plants daily water use. However, the RAPP application shows water use, excluding boiler feed water, to be 1,590 m^3/day (0.42 mgd) which exceeds the plant pumping and storage capacity. Water used as boiler feed is surface water taken from a small pond about 0.4 km (1/4 mi) from the cannery. Boiler feed water is used without any treatment. Water used for cleanup is dosed with Mikroklene DF®, an iodine solution, to yield a concentration of 25 ppm. The Alaska Department of Health and Welfare periodically makes bacteriological analysis of water used at the cannery.

Process Operations

Salmon are processed in a manner similar to that previously described in Section V. A processing sequence schematic for the canning operation is shown in Figure VI-A2. Fish heads are ground and cooked with the recovered oil added to the canned product. Eggs are recovered and processed in the egg house.

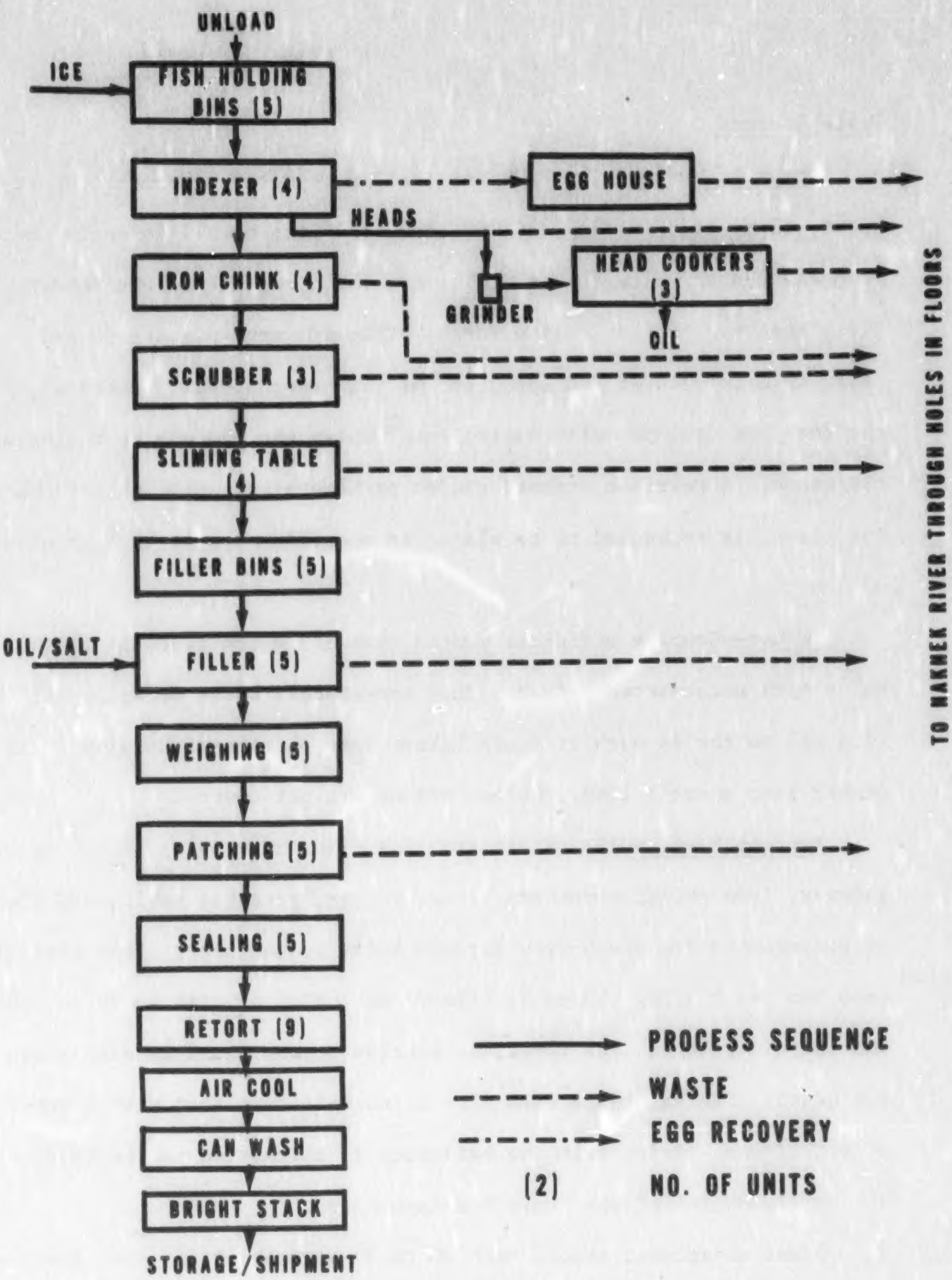
UNLOAD
ICE
FISH HOLDING BINS (5)
INDEXER (4)
EGG HOUSE
HEADS
IRON CHINK (4)
GRINDER
HEAD COOKERS (3)
OIL
SCRUBBER (3)
SLIMING TABLE (4)
FILLER BINS (5)
OIL/SALT
FILLER (5)
WEIGHING (5)
PATCHING (5)
SEALING (5)
RETORT (9)
AIR COOL
CAN WASH
BRIGHT STACK
STORAGE/SHIPMENT
TO NAKNEK RIVER THROUGH HOLES IN FLOORS
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(2)
NO. OF UNITS

Figure VI-A2 Bumble Bee Seafoods, South Naknek, Alaska
Salmon Canning Sequence

Waste Sources

Domestic Wastes--The RAPP application reported a domestic wastewater volume of 38 m^3/day (10,000 gpd). At present all domestic wastes from the cannery flow to a small stream which empties to the Naknek River upstream of the loading docks. Chlorine crystals are dumped daily into toilets at the upper end of the sewer lines. Restrooms on the dock are equipped with Destroilets® which use propane to incinerate the waste. A spirator actived sludge package plant, with chlorine disinfection, is scheduled to be placed in operation by the 1974 canning season.

Refuse--Company officials stated that a 3/4-ton truck is filled daily with uncompacted refuse. This non-process waste is hauled 2.4 km (1.5 mi) to the Borough of South Naknek dump where periodically it is pushed into a small lake. Refuse wastes are not covered.

Process Wastes--All wastes from the fish and canning houses (i.e., indexer, iron chink, scrubbing table, filler, patching table, and cleanup operations) are discharged through holes in the plant floor directly onto the beach below the dock. After each batch of fish heads is cooked and the oil removed, the remaining portion of the batch is discharged to the beach. The egg house uses five brine agitators each with a capacity of 400 liters. Brine from the agitators is discharged to the beach after 450 kg (1,000 lb) of eggs have been processed.

Plant management stated that 20 to 30 percent of the fish that is processed becomes waste. Based on a 21.8 kg (48 lb) case of canned salmon and the estimated production figures for the 1973 season, between 325 and

635 kkg (720,000 and 1,400,000 lb) of fish waste were deposited on beaches and ultimately reached the Naknek River. Waste characteristics reported in the company's RAPP application are shown in Table VI-A1.

Receiving Water Evaluation

An evaluation of the receiving water quality was conducted from 4 to 6 July 1973. The locations of sampling stations, with reference to the plant, are shown in Figure VI-A1 and described in Table VI-A2.

A summary of the results of physical and chemical measurements is shown in Table VI-A3. Dissolved oxygen concentrations on the south shore of the Naknek River near the cannery ranged from 6.8 to 9.6 mg/l. At high tide, surface temperatures, pH and transparency fluctuated slightly. Salinity levels (12.5 to 17.5 ppt) encountered on the south shore indicate that the waters in the area of the cannery are influenced by the saline waters of Kvichak Bay.

Sediment samples were obtained from the tidal flats in front of, under, and at each end of the cannery dock at the locations given in Table VI-A4. The sediment types were mixtures of sand-clay and mud-gravel. No sample contained visual remnants of fish-waste. Samples collected at locations near the point of fish waste discharge contained excessive amounts of carbon and nitrogen. OSI values ranging between 0.5 to 1 indicate that the sediment contains partially stabilized wastes while values between 1 and 5 indicate decomposing wastes. Stations C and D (discharge areas) fall into this latter category, while the remaining three stations fall into a category of stable conditions. Adequate process waste disposal techniques would result in the stablization of the sediments at the present discharge locations.

TABLE VI-A1

SALMON CANNING WASTEWATER CHARACTERISTICS[a]
BUMBLE BEE SEAFOODS - SOUTH NAKNEK, ALASKA

Parameter	Average[b] Concentration	Average Load		Average Load[c,d]	
		(kg/day)	(lb/day)	(kg/case)	(lb/case)
Flow, m^3/day (mgd)	1,500 (0.40)				
pH, su	6.6				
Temperature, °C (°F)	13 (55)				
BOD_5[e]	13,000	19,640	43,300	6.5	14.4
COD[e]	2,710	4,096	9,030	1.37	3.01
Total Solids	8,020	12,160	26,800	4.05	8.93
SS	5,040	7,620	16,800	2.54	5.60
NH_3 as N	30.9	47	103	0.015	0.034
TKN as N	825	1,250	2,750	0.416	0.917
NO_2 as N	0.078	0.118	0.26	0.00005	0.0001
NO_3 as N	1.02	1.55	3.42	0.0005	0.001
Total Phosphorus as P	42.4	64	142	0.021	0.047
Oil and Grease	617	934	2,060	0.312	0.687

a/ Data as reported in company RAPP application.
b/ All values reported as mg/l except where noted.
c/ Based on daily production of 3,000 cases.
d/ Values not reported on RAPP application.
e/ The average daily COD is approximately 20 percent of the BOD. This indicates poor sampling procedures, sample preservation, and/or analytical techniques.

TABLE VI-A2

DESCRIPTION OF WATER QUALITY AND SEDIMENT SAMPLING STATIONS, BUMBLE BEE SEAFOODS, SOUTH NAKNEK, ALASKA

Map Key[a/]	Description
	Water Quality Sampling Stations
1	75 m NE of Station 2
2	10 m N of W end of cannery dock
3	75 m NW of Station 1
4	75 m N of Station 4
5	10 m N of cannery dock mid point
6	75 m N of Station 5
7	75 m N of Station 6
8	10 m N of W end of cannery dock
9	75 m N of Station 8
10	75 m N of Station 9
11	75 m NW of Station 8
	Sediment Sampling Stations
A	20 m E of E corner of cannery dock
B	10 m N of cannery dock at storage area
C	Under dock at mid point of cannery
D	10 m N of cannery dock in unloading area
E	20 m W of cannery dock

[a/] Station locations are shown in Figure VI-A1.

TABLE VI-A3

SUMMARY OF WATER QUALITY
SOUTH NAKNEK, ALASKA

Parameter[a]	Station No.[b]	High Water[c] Surface	Parameter[a]	Station No.[b]	High Water[c] Surface
DO, mg/l	1	8.8-9.4	Salinity, ppt	1	15.0-17.5
	2	8.0-9.0		2	15.0-16.0
	3	6.8-9.3		3	15.2-17.5
	4	8.8		4	15.5-17.5
	5	7.0-9.6		5	15.2-17.0
	6	7.7-9.3		6	16.0-17.5
	7	--		7	12.5-17.0
	8	8.4-9.2		8	15.5-17.5
	9	7.0-9.3		9	16.0-17.0
	10	--		10	13.0-17.0
	11	7.7-9.5		11	15.5-17.0
Temperature °C	1	13.0-15.5	pH	1	8.0-8.5
	2	12.5-16.0		2	8.0-8.5
	3	13.0-15.0		3	8.5-8.5
	4	13.0-15.0		4	8.0-8.5
	5	13.0-15.5		5	8.0-8.5
	6	13.0-15.0		6	8.0-8.5
	7	13.0-14.5		7	8.0-8.5
	8	13.0-15.0		8	8.0-8.5
	9	13.0-15.5		9	8.0-8.5
	10	13.0-14.5		10	8.0-6.5
	11	12.5-15.0		11	8.0-8.5
			Transparency		6 to 91.5 cm

[a] Data are reported as range of values.
[b] Station locations are shown in Figure IV-A1.
[c] No samples were collected during low water periods or from the bottom at high tide.

TABLE VI-A4

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS
SOUTH NAKNEK, ALASKA

Station[a]	Depth	Organic N (percent)	Organic C (percent)	OSI	Bottom Type
A	Tidal Flat	0.08	0.6	0.05	Sand, Clay
B	Tidal Flat	0.12	0.1	0.012	Sand, Gravel
C	Tidal Flat	0.52	2.7	1.40	Mud, Gravel
D	Tidal Flat	1.27	1.6	2.03	Mud, Gravel
E	Tidal Flat	0.12	0.8	0.10	Sand, Clay

[a] Station locations are shown in Figure VI-A1.

Treatment Needs

Domestic wastes from the plant pass untreated to a small stream flowing to the Naknek River. An activated-sludge package plant is scheduled for installation by the start of the 1974 season to provide treatment and effluent disinfection. The plant should be installed and proper operation should be provided.

Process wastes are discharged through holes in the cannery floor to the beach. Forty-eight hours (4 tide cycles) after the canning process had stopped (27 June) several hundred fish tails, some backbones, and other fish wastes were still visible under the dock. All process wastes should be collected without loss through the floor, flumed to a grinder, and discharged to the river at a point below low low tide. The area within a 30 m (100 ft) radius of the point of discharge of the outfall pipe should be monitored for solids accumulation.

A-2 COLUMBIA WARDS FISHERIES, EKUK, ALASKA

General

The Columbia Wards Fisheries cannery, located on an isolated shore line of Nushagak Bay, processes and cans salmon [Figures VI-1 and VI-A3]. In addition, a freezing vessel moored at the cannery processes fish both before and after the major canning season. The plant was originally built in 1902 by North Pacific Salmon Company but was purchased by Columbia Wards Fisheries in 1959.

The cannery employed 155 people during the 1973 canning season (1 June to 1 August). The layout of the plant processing area is shown in Figure VI-A4.

Salmon are processed at a maximum rate of 12,000 cases per day. During odd-numbered years the production mix consists of sockeye (65 percent), chum (25 percent) and chinook (10 percent) salmon. During even-numbered years the mix consists of sockeye (50 percent), chum (15 percent), chinook (10 percent) and pink (25 percent) salmon. Due to decreased fishing, the total projected 1973 production was 40,000 cases. The annual production for the last five years was as follows:

1972	23,000 cases
1971	70,000 cases
1970	130,000 cases
1969	40,000 cases
1968	80,000 cases

Because of a reduced salmon catch, caused by altered fishing regulations during the 1973 season, not all of the canneries in the area could operate economically. Combines, in which one cannery processed fish for other canneries, were formed. Columbia Wards Fisheries was canning salmon for Queen Fisheries and for Alaska Packers at Clarks Point.

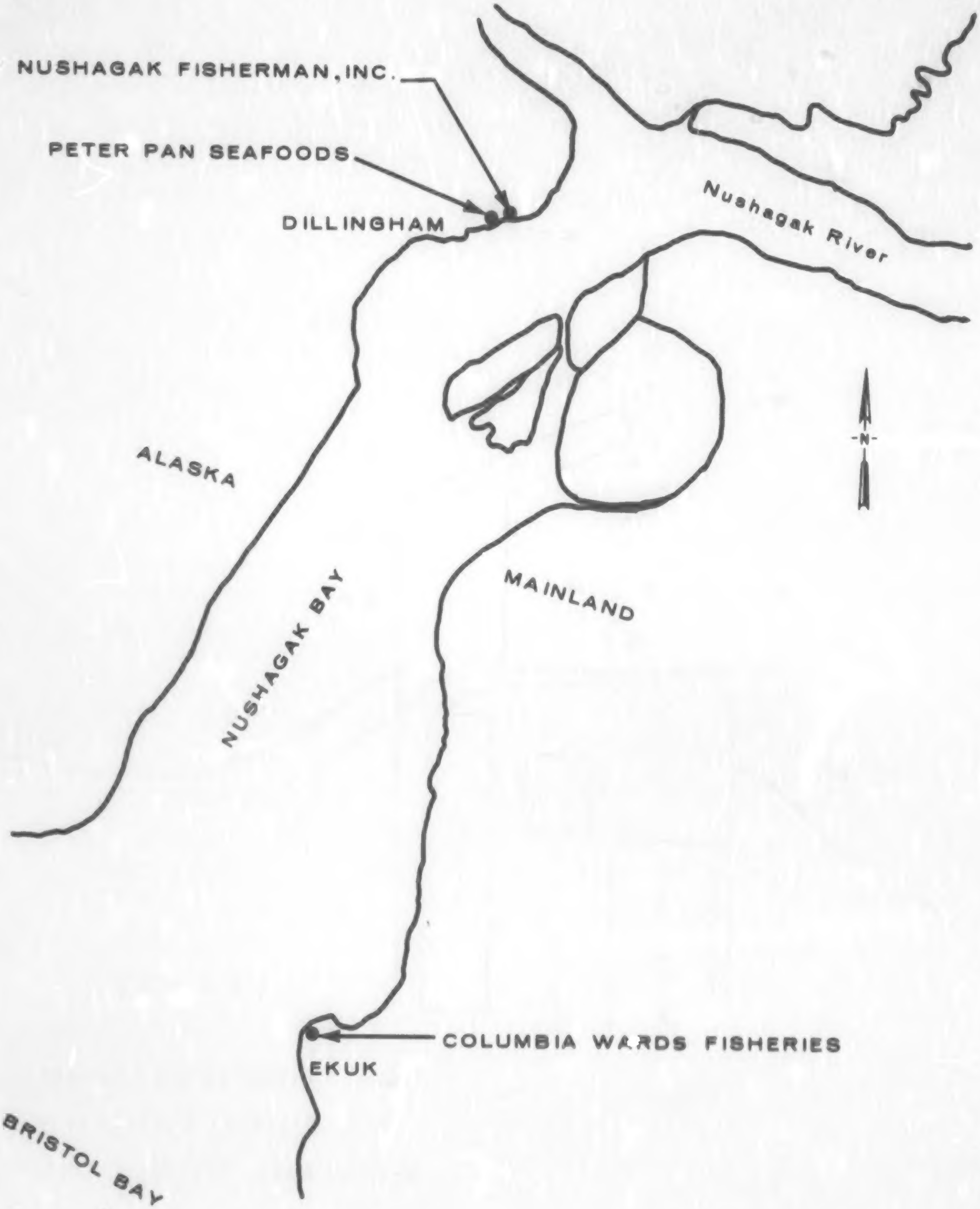
NUSHAGAK FISHERMAN, INC.
PETER PAN SEAFOODS
DILLINGHAM
Nushagak River
ALASKA
-N-
NUSHAGAK BAY
MAINLAND
COLUMBIA WARDS FISHERIES
EKUK
BRISTOL BAY

Figure VI-A3. Columbia Wards Fisheries, Ekuk, Alaska Location Map

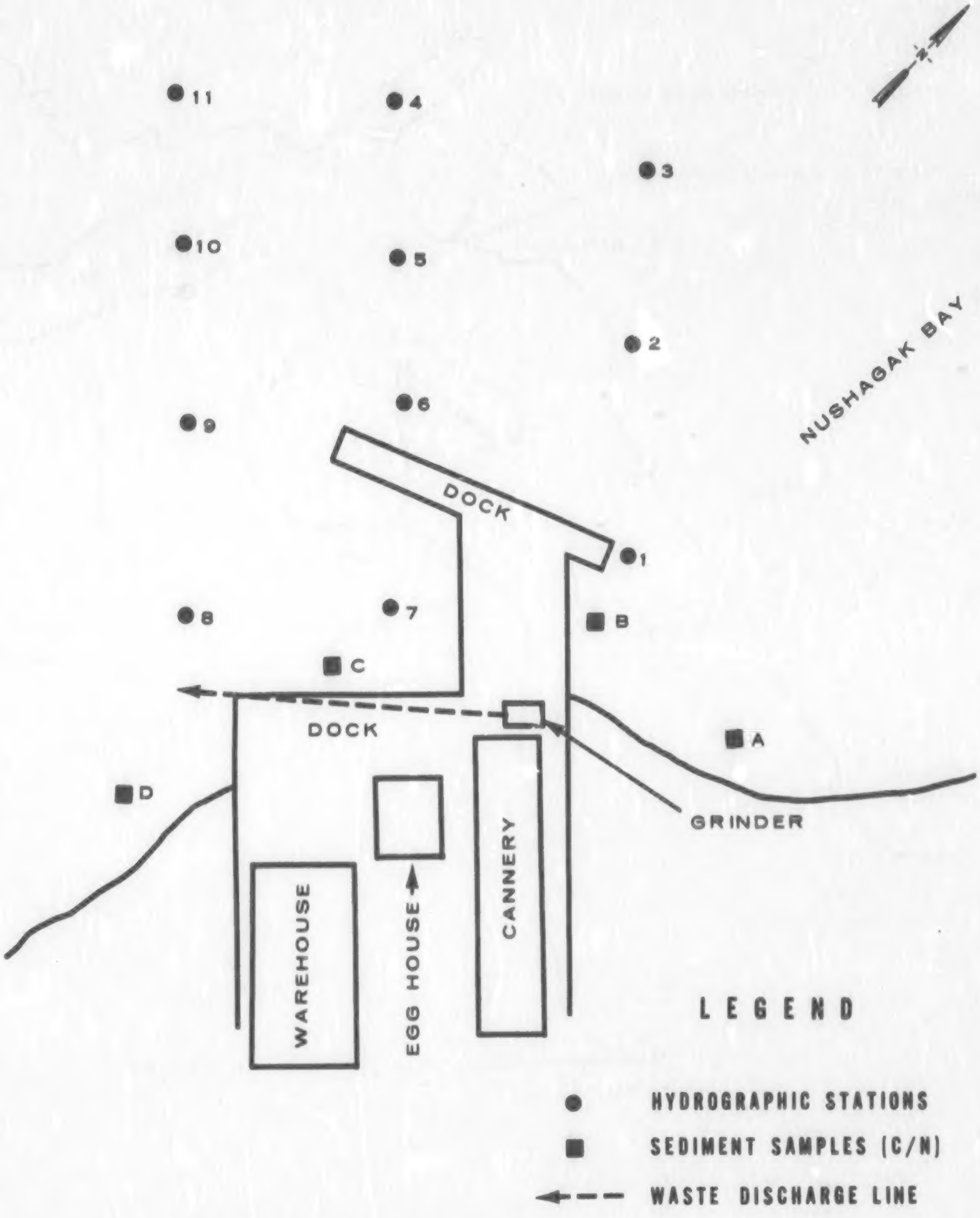
N
● 11
● 4
● 3
● 10
● 5
● 2
● 6
● 9
NUSHAGAK BAY
DOCK
● 1
● 8
● 7
■ B
■ C
DOCK
■ A
■ D
GRINDER
WAREHOUSE
EGG HOUSE
CANNERY
LEGEND
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)
◄--- WASTE DISCHARGE LINE

Figure VI–A4. Columbia Wards Fisheries, Ekuk, Alaska
Plant Layout - Station Locations

A Refuse Act Permit Program (RAPP) application was filed with the Corps of Engineers on 4 January 1972. An in-plant survey of Columbia Wards Fisheries was conducted by EPA personnel of the National Field Investigations Center-Denver from 30 June to 2 July 1973. Jim Ekern, superintendent, provided information and assistance.

Water Supply

Water for domestic use and cannery operations is obtained from three sources. Wells supply about 76 m^3/hr (20,000 gph) under normal conditions; during peak canning operations, the pumping draft on the wells can be increased to 114 m^3/hr (30,000 gal/hr). The second source is a lake that is used only when the cannery is operating at full capacity. A 10 cm (4 in.) line carries water to the cannery. The third source which supplies boiler feed water to the plant is a small pond. Total water consumption within the plant as reported by the RAPP application is 570 m^3/day (150,000 gpd).

All water is treated with chlorine gas to produce a 1 ppm residual except for boiler feed water which is untreated. Cleanup water is treated with Mikroklene DF®, an iodine solution, to a concentration of 25 ppm. Water samples are periodically sent to the State Department of Health and Welfare bacteriological analysis.

Process Operations

The plant processes salmon in a manner similar to that previously described in Section V. Only a portion of the heads are ground for recovery of the oil. A processing and waste schematic is shown in Figure VI-A5.

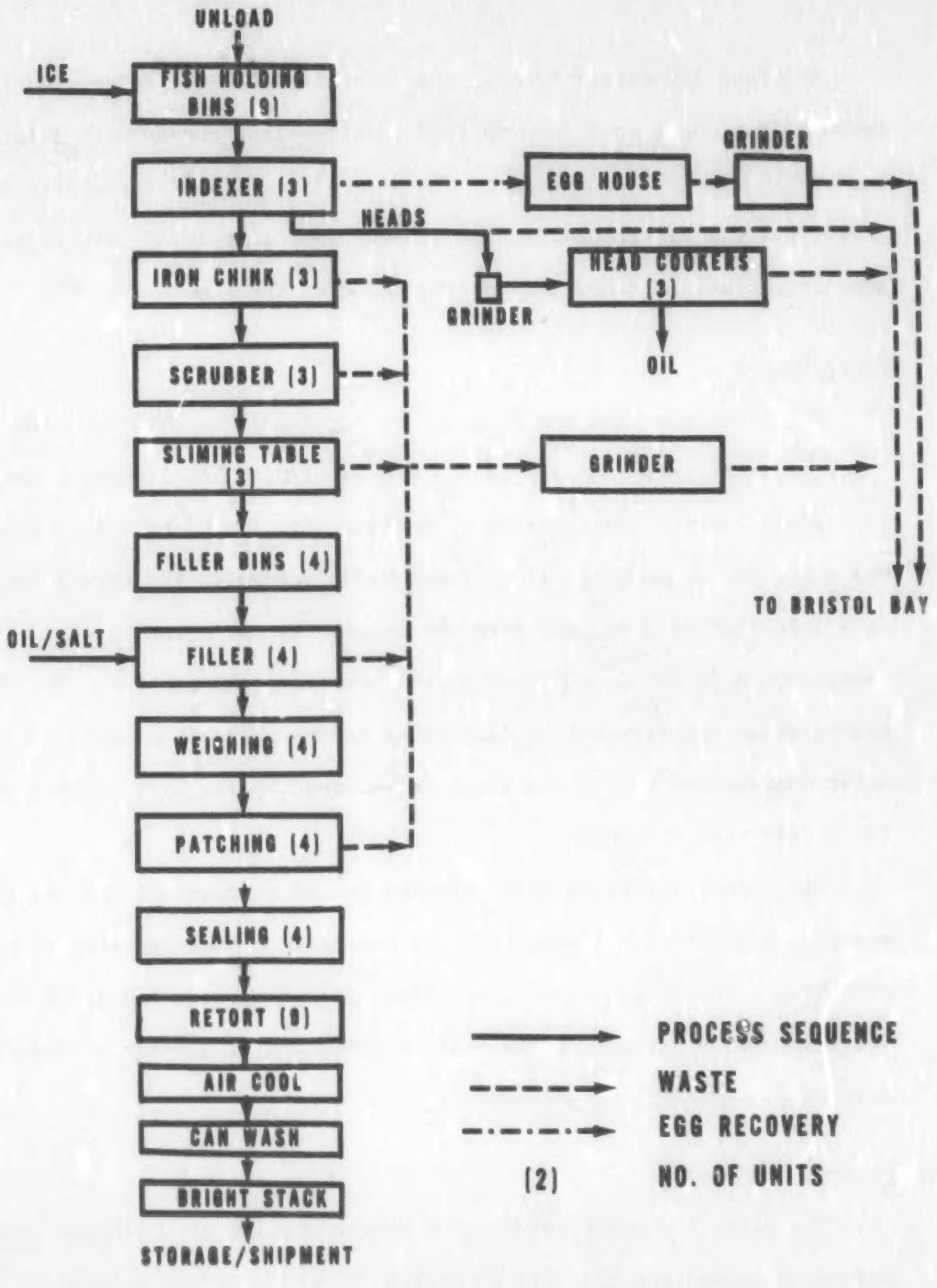
UNLOAD
ICE
FISH HOLDING BINS (9)
INDEXER (3)
EGG HOUSE
GRINDER
HEADS
IRON CHINK (3)
GRINDER
HEAD COOKERS (3)
OIL
SCRUBBER (3)
SLIMING TABLE (3)
GRINDER
FILLER BINS (4)
TO BRISTOL BAY
OIL/SALT
FILLER (4)
WEIGHING (4)
PATCHING (4)
SEALING (4)
RETORT (9)
AIR COOL
CAN WASH
BRIGHT STACK
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(2)
NO. OF UNITS

Figure VI–A5. Columbia Wards Fisheries, Ekuk, Alaska
Salmon Canning Sequence

Waste Sources

Domestic Wastes--Domestic wastes are discharged to the individual septic tanks of each building with a total of about 24 tanks in use. The RAPP application reported a total of 38 m^3/day (10,000 gpd) of wastewater discharged from these tanks.

Refuse--Company officials could not estimate the amount of refuse generated per day. All refuse wastes are landfilled on cannery property and covered once each week.

Process Wastes--Wastes from operations within the fish house and the canning house are collected and flumed under the dock to a bucket elevator which transports the waste to a grinder. Those fish heads not cooked for oil are also diverted to the grinder. The ground wastes are discharged through a pipe connected to the underside of the dock and fall into the water at high tide and onto the beach at low tide. As stated previously, a portion of the fish heads are ground and cooked for oil. After each batch of heads have been cooked and the oil removed, the remaining material is discharged to the beach.

The egg house uses four agitators having a capacity of 400 liters each. The brine from the agitators is discharged one to four times daily depending on the amount of roe (eggs) processed. Wastes from the egg house are ground and discharged below to either the beach or water surface depending on the tide level.

Cannery officials estimated that the production of one case of canned salmon (21.8 kg or 48 lb) required about 35 kg (78 lb) of raw material with 1.4 kg (3 lb) of byproducts (eggs), 3.5 kg (7.8 lb) of head oil, and 7.7 kg (17 lb) of waste. On the basis that 12,000 cases/day are produced, the plant would have discharged 308 kkg (680,000 lb) of process waste to Nushagak Bay in 1973. The waste characteristics of the plant, as reported in the RAPP application, are given in Table VI-A5.

Receiving Water Evaluation

Water quality data were collected from 6 to 8 July 1973. A description of sampling station locations is given in Table VI-A6. The cannery was not in operation during the field study; thus, the measured water quality [Table VI-A7] should represent the background levels for the receiving waters at this location. Sampling was limited to the high tide periods because of the wide tidal range and its associated extensive intertidal zone at low water.

No unusual variations in dissolved oxygen were observed at the eleven sampling stations [Table VI-A7]. Water temperatures were relatively high (12.5 to 14.5°C) for Alaska waters, probably due to the width and shallowness of Nushagak Bay. The influence of the Nushagak River is still evident at this point of the Bay and as a consequence the salinities were very low and variable with a range of 1.2 to 7.3 ppt. There were no meaningful changes noted in pH, and transparency measurements were limited to centimeters as a consequence of several days of high onshore winds.

Four sediment samples were obtained at low tide on the tidal flats surrounding the cannery dock [Table VI-A8]. Although the cannery had not been operating for several days, fish wastes were evident. Of the four samples taken, three revealed an OSI above 2.00 indicating

TABLE VI-A5

SALMON CANNING WASTEWATER CHARACTERISTICS[a]
COLUMBIA WARDS FISHERIES, EKUK, ALASKA

Parameter	Average[b] Concentration	Average Load (kg/day)	Average Load (lb/day)	Average Load[c] (kg/case)	Average Load[c] (lb/case)
Flow, m^3/day (mgd)	490 (0.13)			328 l (86.7 gal)/case	
pH, su	7.1				
Temperature, °C (°F)	13 (55.4)				
BOD_5	4,740	2,330	5,140	1.56	3.43
COD	6,520	3,210	7,080	2.14	4.72
Total Solids	18,600	9,160	20,200	6.12	13.5
SS	7,290	3,580	7,900	2.39	5.27
NH_3 as N	114	56	123	0.037	0.082
TKN as N	1,390	680	1,500	0.45	1.00
NO_2 as N	0.146	0.072	0.159	0.0005	0.001
NO_3 as N	1.01	0.50	1.10	0.030	0.067
Total Phosphorus as P	91.1	44.9	98.9	0.03	0.066
Oil and Grease	1,410	694	1,530	0.46	1.02

a/ Data as reported in company RAPP application.
b/ All values reported as mg/l except where noted.
c/ Based on daily production of 1,500 cases. Values not reported in RAPP application.

TABLE VI-A6

DESCRIPTION OF WATER QUALITY AND SEDIMENT SAMPLING STATIONS, COLUMBIA WARDS FISHERIES EKUK, ALASKA

Map Key[a]	Description
	Water Quality Sampling Stations
1	10 m SE of cannery dock
2	25 m N of Station 1
3	25 m N of Station 2
4	25 m N of Station 5
5	25 m N of Station 6
6	10 m N of W end of cannery dock
7	Between onshore and offshore cannery docks W side
8	15 m NW of onshore cannery dock
9	25 m N of Station 8
10	25 m N of Station 9
11	25 m N of Station 10
	Sediment Sampling Stations
A	25 m SE of cannery dock
B	10 m E of cannery approach dock
C	5 m N of onshore cannery dock (midpoint)
D	25 m SW of onshore cannery dock

[a] Station locations are shown in Figure VI-A4.

TABLE VI-A7

SUMMARY OF WATER QUALITY
EKUK, ALASKA

Parameter a/	Station No. b/	High Water c/ Surface	Parameter a/	Station No. b/	High Water c/ Surface
DO, mg/l	1	8.6-10.0	Salinity, ppt	1	1.5-6.0
	2	8.8-9.8		2	1.2-7.1
	3	9.6		3	1.6-9.0
	4	—		4	3.5-7.4
	5	8.9-9.4		5	3.0-7.3
	6	8.8-10.0		6	1.5-5.7
	7	8.5-10.0		7	1.5-5.7
	8	8.6-9.5		8	2.0-6.2
	9	8.9-9.4		9	2.5-6.0
	10	8.8-9.3		10	4.5-7.5
	11	--		11	3.5-8.0
Temperature °C	1	12.0-14.5	pH	All stations	7.5
	2	12.0-14.0	Transparency		6 to 24 cm
	3	12.0-14.0			
	4	12.0-13.5			
	5	12.0-14.0			
	6	12.0-14.5			
	7	12.0-14.5			
	8	12.0-14.5			
	9	12.0-13.5			
	10	12.5-13.5			
	11	12.0-13.5			

---

a/ Data are reported as range of values.
b/ Station locations are shown in Figure VI-A4.
c/ No samples were collected during low water periods or from the bottom during high water.

substantial nitrogen contribution with further waste stabilization likely. The type of sediment observed in the area was a mixture of mud, sand, clay and gravel.

TABLE VI-A8

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS
EKUK, ALASKA

Station[a]	Depth	Organic N (percent)	Organic C (percent)	OSI	Bottom Type
A	Tidal Flat	2.40	1.0	2.40	Mud, Clay
B	Tidal Flat	0.98	3.5	3.43	Fish Wastes, Mud, Gravel
C	Tidal Flat	0.70	3.1	2.17	Fish Wastes, Mud, Gravel
D	Tidal Flat	0.17	1.6	0.27	Sand, Gravel

[a] Station locations are shown in Figure VI-A4.

Treatment Needs

Process wastes are collected and ground prior to discharge. However, during the survey period, some problems with the plant system occurred. At the point where the flumed wastes enter the bucket elevator before transfer to the grinder, spillage was occurring. Although the amount of spillage was not great, the waste disposal system could be overloaded during peak processing seasons and significant amounts of waste overflow could occur.

Solids deposits were evident at all of the discharge locations at low tide. This problem could be eliminated by collecting all the wastes into a common line and discharging them below low low tide. The area located within a 30 m (100 ft) radius of the discharge pipe should be monitored for solids accumulation.

A-3 NELBRO PACKING COMPANY, NAKNEK, ALASKA

General

Nelbro Packing Company, a subsidiary of B. C. Packers in Richmond, British Columbia, operates a salmon cannery on the Naknek River near the Borough of Naknek, Alaska [Figures VI-1 and VI-A6]. The plant, built in 1960 by the American Packing Company, was purchased by the Nelbro Packing Company in 1963. The layout of the plant processing area is shown in Figure VI-A7.

During the 1973 season between 150 to 200 employees, including fishermen, worked at the plant. In peak production years, the number may be as high as 400. The cannery usually operates from 22 June to 20 July with the actual number of processing days varying with the catch for the year. About 95 percent of the salmon produced are sockeye, two to four percent chum, and the remainder are chinook. Salmon are processed at a maximum rate of 10,000 cases per day with a projected 1973 production of 30,000 to 50,000 cases. The annual production for the last five years was as follows:

1972	37,000 cases
1971	67,650 cases
1970	113,000 cases
1969	50,150 cases
1968	27,000 cases

Because of a reduced salmon catch, caused by decreased runs and altered fishing regulations during the 1973 season, not all of the canneries in the area could operate economically. Combines, in which one cannery processes fish for other canneries, were formed. Nelbro Packing Company processed and canned salmon for Whitney-Fidalgo Seafoods, Inc. and the New England Fish Company, both in Naknek.

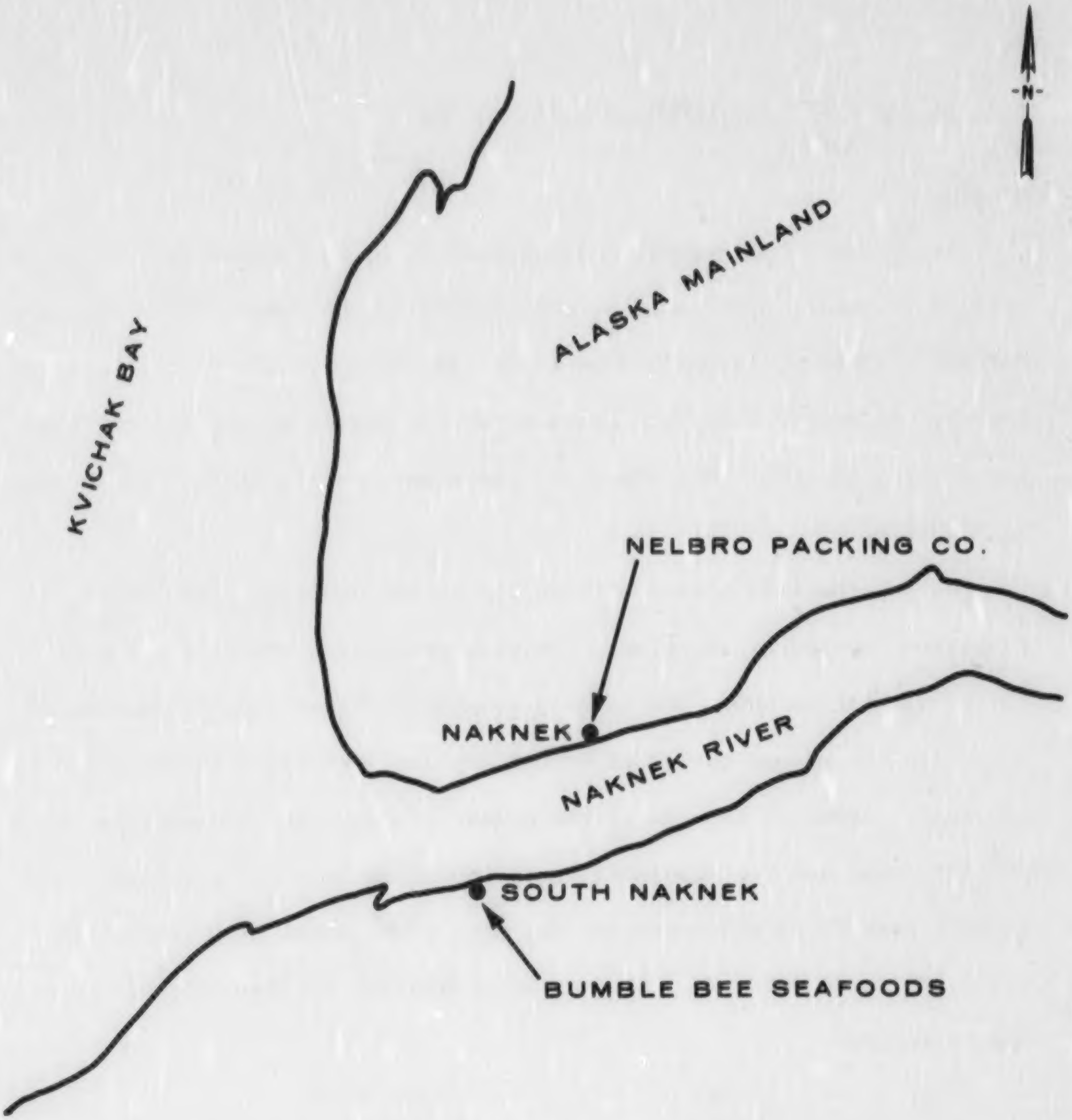
-N-
KVICHAK BAY
ALASKA MAINLAND
NELBRO PACKING CO.
NAKNEK
NAKNEK RIVER
SOUTH NAKNEK
BUMBLE BEE SEAFOODS

Figure VI–A6. Nelbro Packing Company, Naknek, Alaska Location Map

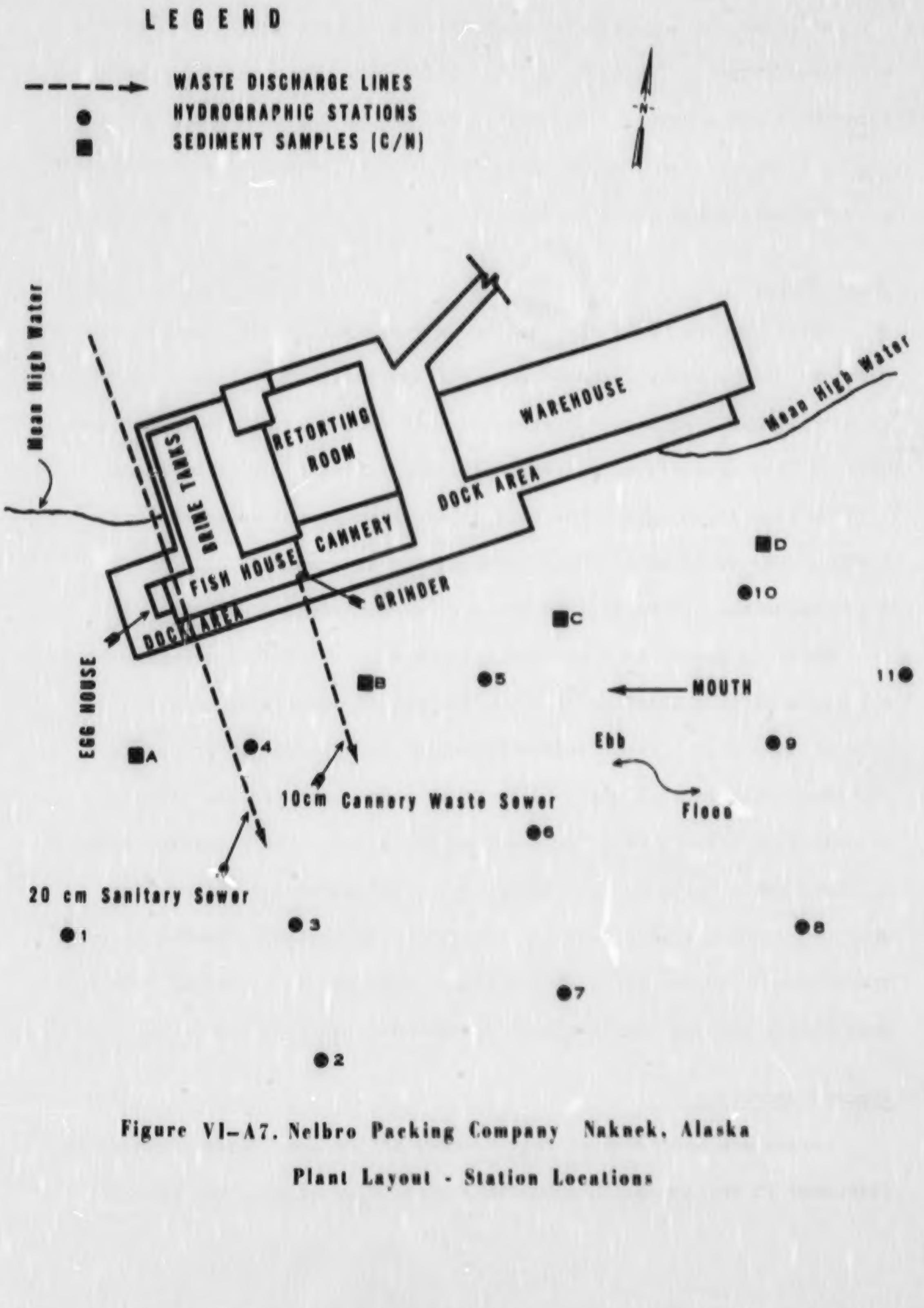
LEGEND
WASTE DISCHARGE LINES
HYDROGRAPHIC STATIONS
SEDIMENT SAMPLES (C/N)
N
Mean High Water
BRINE TANKS
RETORTING ROOM
WAREHOUSE
Mean High Water
DOCK AREA
CANNERY
FISH HOUSE
GRINDER
DOCK AREA
EGG HOUSE
D
10
C
11
B
5
MOUTH
A
4
Ebb
9
Flood
10cm Cannery Waste Sewer
6
20 cm Sanitary Sewer
1
3
8
7
2

Figure VI-A7. Nelbro Packing Company Naknek, Alaska

Plant Layout - Station Locations

A Refuse Act Permit Program (RAPP) application was filed with the U.S. Army Corps of Engineers in June 1972. EPA personnel from the National Field Investigations Center-Denver and Region X conducted an in-plant survey from 25 to 27 June 1973. Trevor Beeston, superintendent, provided assistance and information.

Water Supply

Water for the Nelbro Packing Company operations and domestic use is obtained from a clear, sand-bottom lake approximately 0.8 km (0.5 mi) from the plant. Although water use varies depending on the amount and rate of fish production, company officials estimated it to be about 1,100 m^3/day (0.30 mgd). The RAPP application listed water usage at 1,900 m^3/day (0.50 mgd). Water samples are sent periodically to the State Department of Health and Welfare for bacteriological analysis.

Water is pumped to the plant through a 20 cm (8 in.) aluminum line. A portion of this water is diverted for use in the living area and is treated with a 12 percent sodium hypochlorite solution to produce a chlorine residual of 1 ppm. Water is also diverted for use without treatment as boiler and power plant makeup water. The remaining portion of the water is used in the cannery for brine water makeup, cooling retorts, washing salmon during processing, and cleanup. During operations process water is treated with chlorine gas at a rate of 5 to 7 ppm; during cleanup the dosage is increased to 40 to 50 ppm.

Process Operation

Salmon are processed at this cannery in the same general manner as discussed in Section V. A specific process flow diagram for Nelbro

Packing Company is shown in Figure VI-A8. Fish heads are ground and cooked for oil only during periods of high salmon production.

Waste Sources

Domestic Wastes--All domestic wastes are discharged without treatment through a 20 cm (8 in.) sewer to the Naknek River. The RAPP application listed domestic wastewater discharge at 76 m^3/day (20,000 gpd).

Refuse--Company officials estimated that two 2-1/2 ton truckloads of uncompacted refuse were generated daily. This waste is hauled 6.5 km (4 mi) to the Naknek Borough landfill. Dirt is hauled to the landfill from another location; however not all of the refuse is completely covered.

Process Wastes--The fish house has concrete floors which facilitates collection of the wastes from the indexer, iron chink, scrubbing table and cleanup operations. These wastes are flumed to a sump with a volume of 3.8 m^3 (1,000 gal.). At the sump wastes are ground and pumped 46 m (150 ft) beyond the dock face into the Naknek River. The discharge is above low mean tide level. The canning house has wooden floors with slits that allow wastes to drop directly onto the beach. The cooling water from the retorts is discharged directly to the beach.

Fish heads are ground and cooked for oil which is removed. The material that remains is discharged to the beach. During years of high salmon production, excess ground fish heads are discharged directly to the beach. Four brine agitators are used in the egg house. Each agitator has a capacity of 530 liters (140 gal.) and discharges brine to the beach once every two days.

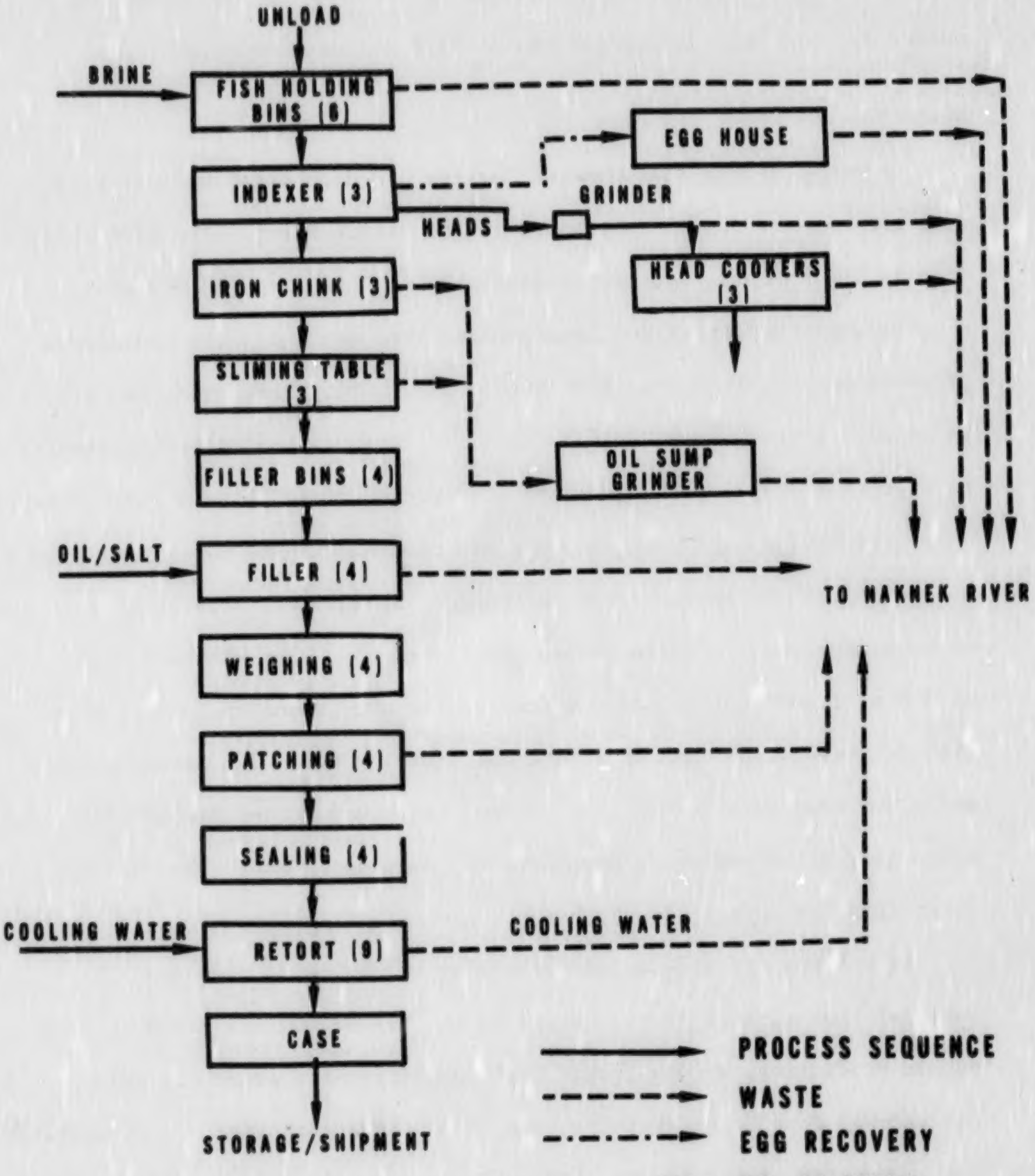
UNLOAD
BRINE
FISH HOLDING BINS (6)
EGG HOUSE
INDEXER (3)
GRINDER
HEADS
HEAD COOKERS (3)
IRON CHINK (3)
SLIMING TABLE (3)
OIL SUMP GRINDER
FILLER BINS (4)
OIL/SALT
FILLER (4)
TO NAKNEK RIVER
WEIGHING (4)
PATCHING (4)
SEALING (4)
COOLING WATER
RETORT (9)
COOLING WATER
CASE
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(2) NO. OF UNITS

Figure VI-A8. Nelbro Packing Company Naknek, Alaska Salmon Canning Sequence

Plant management stated that the production of one case of salmon (weighing 21.8 kg or 48 lb) required 30.6 kg (67.5 lb) of raw material with 5 kg (11 lb) of waste and byproduct recovery consisting of 0.45 to 0.9 kg (1 to 2 lb) of eggs and 3 kg (6.7 lb) of head oil. The waste load generated in the production of salmon at this cannery would correspond to 150 to 250 kkg (330,000 to 550,000 lb) of waste material being discharged to the Naknek River during the 1973 season.

Receiving Water Evaluation

An evaluation of the receiving water quality in the area of Nelbro Packing Company was conducted from 1 to 3 July 1973. The location of sampling stations, with reference to the plant, are shown in Figure VI-A7 and described in Table VI-A9.

A summary of the results of physical and chemical measurements is given in Table VI-A10. Extreme tidal variations occur in the area of the cannery (Figure VI-1); thus, measurements were made only under high tide conditions. Dissolved oxygen levels in this area were the lowest recorded during the survey. One value at station 5 was recorded at 5.9 mg/l.* At high water tide, surface and bottom temperatures, salinity, and pH showed only minor changes. Transparency was variable and reflected the sediment load in the river at the time of measurement.

Sediment samples for OSI measurements were obtained at four stations along the dock face while the river bottom was exposed [Figure VI-A7]. Bottom sediments were composed of a mixture of mud, sand, and gravel

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* The receiving water standard for dissolved oxygen in Alaska is 6.0 mg/l.

TABLE VI-A9

DESCRIPTION OF WATER QUALITY AND SEDIMENT SAMPLING STATIONS, NELBRO PACKING COMPANY NAKNEK, ALASKA

Map Key[a]	Description
	Water Quality Sampling Stations
1	60 m SW of W end of cannery dock
2	50 m S of Station 3
3	50 m S of Station 4
4	10 m S of W end of cannery dock
5	10 m S of midpoint of cannery dock
6	50 m S of Station 5
7	50 m S of Station 6
8	50 m S of Station 9
9	50 m S of Station 10
10	10 m S of E end of cannery dock
11	60 m SE of E end of cannery dock
	Sediment Sampling Stations
A	15 m SW of W end of cannery dock
B	10 m S of dock at cannery midpoint
C	10 m S of dock at W corner of warehouse
D	15 m SE of E end of cannery dock

---

a/ Station locations are shown on Figure VI-A7.

TABLE VI-A10

SUMMARY OF WATER QUALITY
NELBRO PACKING COMPANY
NAKNEK, ALASKA

Parameter[a]	Station No.[b]	High Water[c]		Parameter[a]	Station No.[b]	High Water[c]	
		Surface	Bottom			Surface	Bottom
DO, mg/1	1	6.5-9.3	8.5	Salinity, ppt	1	9.5-13.0	12.5
	2	---	---		2	12.0-14.0	14.0
	3	6.8-9.3	8.6		3	11.5-13.0	13.0
	4	6.5-9.2	8.4		4	9.5-13.0	13.0
	5	5.9-9.1	9.1		5	10.5-16.0	13.0
	6	7.1-9.3	9.1		6	11.5-14.0	12.0
	7	8.4	---		7	11.5-14.0	13.5
	8	8.8	---		8	11.5-14.5	14.5
	9	6.1-9.4	9.1		9	11.0-14.0	13.0
	10	8.0-9.3	8.6		10	11.5-13.0	13.0
	11	6.5-9.3	6.7-9.1		11	11.5-13.5	14.5-15.0
Temperature °C	1	12.5-14.0	13.0	pH	1	8.5-8.5	8.5
	2	12.5-14.0	13.5		2	8.0-8.5	8.5
	3	12.5-14.0	13.5		3	8.0-8.5	8.5
	4	12.5-14.0	13.5		4	8.0-8.5	8.5
	5	12.5-15.5	13.5		5	8.0-8.5	---
	6	12.5-14.5	13.0		6	8.0-8.5	8.0
	7	12.5-14.0	13.5		7	8.0-8.5	8.0
	8	12.5-14.5	14.0		8	8.0-8.5	8.5
	9	12.5-14.5	13.5		9	8.0-8.5	8.5
	10	12.5-14.5	13.5		10	8.0-8.5	8.0
	11	12.5-15.0	14.0-14.5		11	8.0-8.5	8.5
				Transparency		15 to 36.5 cm	

---

[a] Data are reported as range of values.
[b] Station locations are shown in Figure VI-A7.
[c] No samples were collected during low water periods.

[Table VI-A11]. The sample from Station B obtained at the midpoint of the cannery dock near the area where fish wastes are discharged contained traces of fish waste and had an OSI of 8.04. OSI values exceeding 5.0 indicate that the sediment is unstable and contains actively decomposing sludge.

TABLE VI-A11

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS
NAKNEK, ALASKA

Station[a]	Depth	Organic N (percent)	Organic C (percent)	OSI	Bottom Type
A	Tidal Flat	0.08	0.6	0.05	Mud, Sand, Gravel
B	Tidal Flat	2.87	2.8	8.04	Fish Wastes, Mud, Gravel
C	Tidal Flat	0.08	0.7	0.06	Mud, Sand, Gravel
D	Tidal Flat	0.05	0.1	0.005	Mud, Sand, Gravel

[a] Station locations are shown in Figure VI-A7.

Treatment Needs

Presently, domestic wastes are collected and discharged directly to the Naknek River. Nelbro Packing Company should either 1) provide subsurface treatment of all sanitary wastes (such as a septic tank with leach field), 2) discharge to a treatment facility that is providing secondary treatment or is on an approved compliance schedule, or 3) provide secondary treatment (40 CFR 133) using a package plant.

The process wastes that are collected and discharged to the river through a 10 cm (4 in.) pipe displayed a visible waste plume during high tide, and a solids buildup was observed near the discharge point during low tide. After processing stopped, one tide cycle removed this deposit. Wastes from the canning operation, retorting, head cooking and egg processing that are now dumped directly on the beach should be collected and flumed to the existing disposal system.

During peak processing years when the cannery will be discharging much larger quantities of waste, solids deposition may occur resulting in water quality problems. To protect water quality, process wastes should be collected, ground and discharged below lower low mean water level. The area within a 30 m (100 ft) radius of the discharge pipe should be monitored for solids accumulation.

A-4 NUSHAGAK FISHERMAN, INC., DILLINGHAM, ALASKA

General

Nushagak Fisherman, Inc. operates a seafood processing and freezing plant on the Nushagak River in Dillingham, Alaska [Figures VI-1 and VI-A9]. The plant, completed in May 1973, was leased to Nushagak Fisherman, Inc., a co-op fishery, on 25 May 1973 for a 40-year period. Plant construction was funded jointly by the city of Dillingham and the U.S. Government Economic Development Administration. The plant, employing between 55 and 80 people, processes fish throughout the year, operating 20 hours per day during peak processing days. Frozen salmon is the principal product; however, herring, bottom fish, and tanner crab are also processed. The layout of the plant processing area is shown in Figure VI-A10. The plant has a salmon processing capacity of 227 kkg (0.5 million lb) in cold storage, 45 kkg (100,000 lb) in brine storage and 18 kkg (40,000 lb) in sharp freezing. The projected salmon production for 1973 was 910 kkg (2 million lb).

A Refuse Act Permit Program (RAPP) application through the Army Corps of Engineers was not filed due to the opening date of the plant. EPA personnel from the National Field Investigations Center-Denver conducted an in-plant survey from 3 to 5 July 1973. Ray Parks, general manager, provided assistance and information.

Water Supply

Water for domestic purposes and the processing plant is purchased from the city of Dillingham. Water obtained from a company well (1.25 l/sec or 20 gpm) is used in the egg house operations. The city water supply is chlorinated, but the water obtained from the well is used untreated.

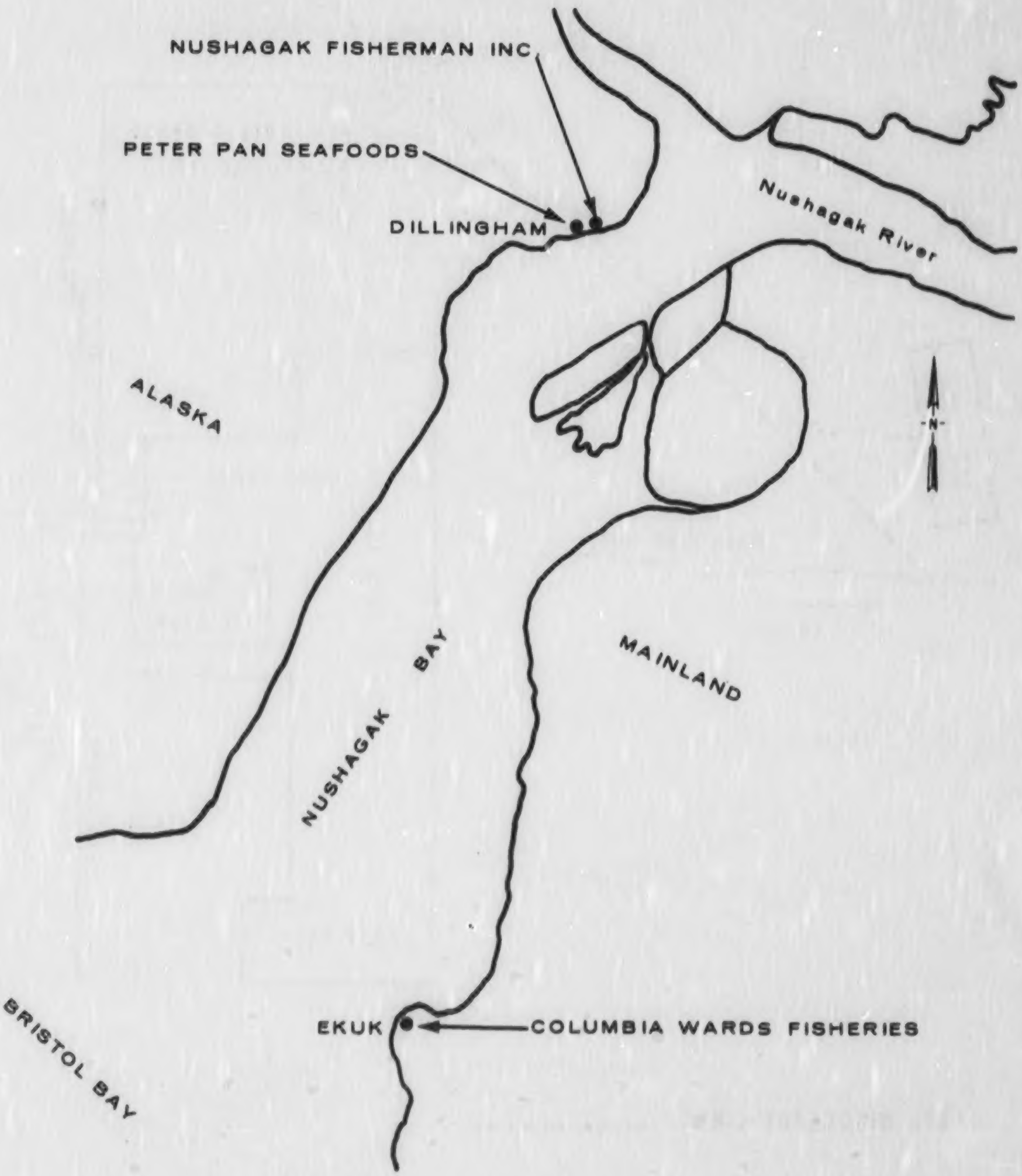
NUSHAGAK FISHERMAN INC.
PETER PAN SEAFOODS
DILLINGHAM
Nushagak River
ALASKA
N
NUSHAGAK BAY
MAINLAND
BRISTOL BAY
EKUK
COLUMBIA WARDS FISHERIES

Figure VI-A9. Nushagak Fisherman, Inc., Dillingham, Alaska Location Map

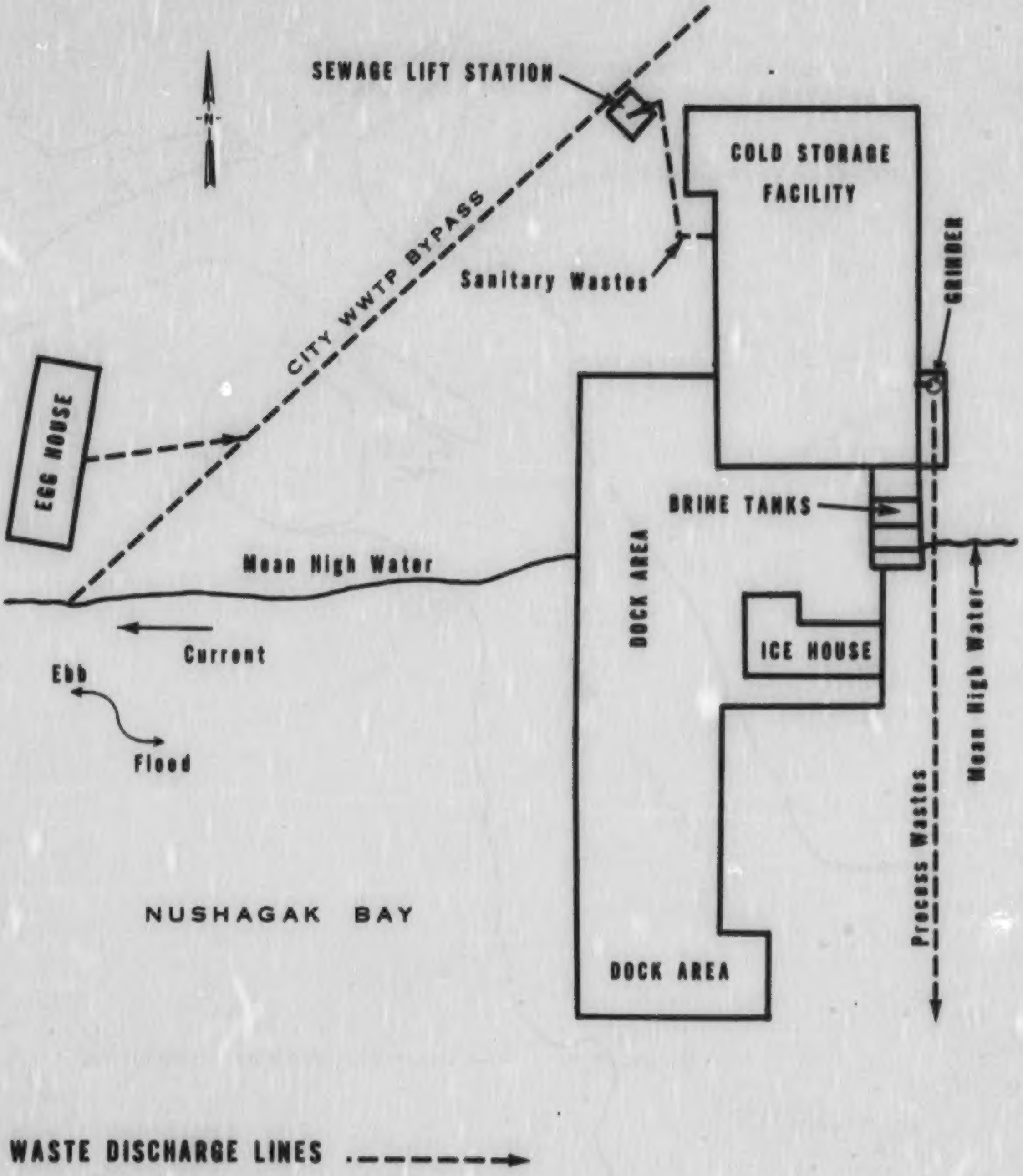
N
SEWAGE LIFT STATION
CITY WWTP BYPASS
COLD STORAGE FACILITY
Sanitary Wastes
GRINDER
EGG HOUSE
BRINE TANKS
Mean High Water
DOCK AREA
ICE HOUSE
Current
Ebb
Flood
Mean High Water
Process Wastes
NUSHAGAK BAY
DOCK AREA
WASTE DISCHARGE LINES

Figure VI-A10. Nushagak Fisherman Inc., Dillingham, Alaska
Plant Layout

Company officials estimated the total water usage between 57 and 76 m^3 (15,000 and 20,000 gal.) per week.

Process Operations

Fish, which are delivered to the plant in scows and by individual fishing boats, can be stored in brine tanks or processed immediately. The fish are taken into the plant in bins and hand-butchered. Heads and viscera are removed from chinook salmon; gills and viscera are removed from other salmon. Butchered fish are quick frozen in the sharp freezer (-40°C for 6 hr) and placed in cold storage until shipped. Eggs are taken in baskets to the egg house and cured in brine agitators, further cured in cedar boxes, and hand-packed for shipment to Japan.

Waste Sources

Domestic Wastes--Domestic wastes from the cannery flow to the city sewer system. Mr. Parks stated that the city does not treat domestic wastes because of the high cost of operating their existing wastewater treatment plant. Therefore, all domestic wastes from the city and plant are by-passed to the Nushagak River. The wastewater treatment plant appeared abandoned inasmuch as no maintenance of equipment was evident.

Refuse--Dillingham Refuse Service collects a 1.5 m^3 dumpster of refuse waste twice weekly. This waste is taken to the city landfill for disposal.

Process Wastes--Process consist primarily of viscera, slime, blood and gills. (Heads are recovered and given to the local residents and do not contribute to the plant waste load.) Process wastes are flumed to a grinder and then discharged to the river about 20 m beyond the face of the dock. The discharge location is above the low mean tide level. The egg house uses three brine agitators for egg curing with a total capacity of 1,100 liters. These brine agitators are discharged to the river every two days.

Company officials estimated that from 12 to 15 percent of the incoming fish weight becomes a waste product. Based on the estimated salmon production between 113 and 136 kkg (250,000 and 300,000 lb) of waste fish were discharged to the Nushagak River during the salmon processing season of 1973.

Receiving Water Evaluation

The City of Dillingham is situated at the head of Nushagak Bay, a large estuary connected to Bristol Bay. The salmon cannery is on the shore at the confluence of Nushagak Bay and the Nushagak River. The tidal range is approximately 519 m (19.5 ft) and leaves a 0.6 m (2 ft) depth at the cannery wharf at low water. Current velocities reach 4 kn at certain stages of both flood and ebb tides.

The receiving water evaluation was conducted from 9 to 13 July 1973. Because of the mean proximity [Figure VI-A11] of the Nushagak Fisherman plant to the Peter Pan Seafoods plant [see Section VI, A-5], the receiving water evaluation was applicable to both operations. During the evaluation neither plant was operating; thus, water quality data reflect normal conditions. Sampling station locations for the evaluation are shown in Figure VI-A11 and described in Table VI-A12.

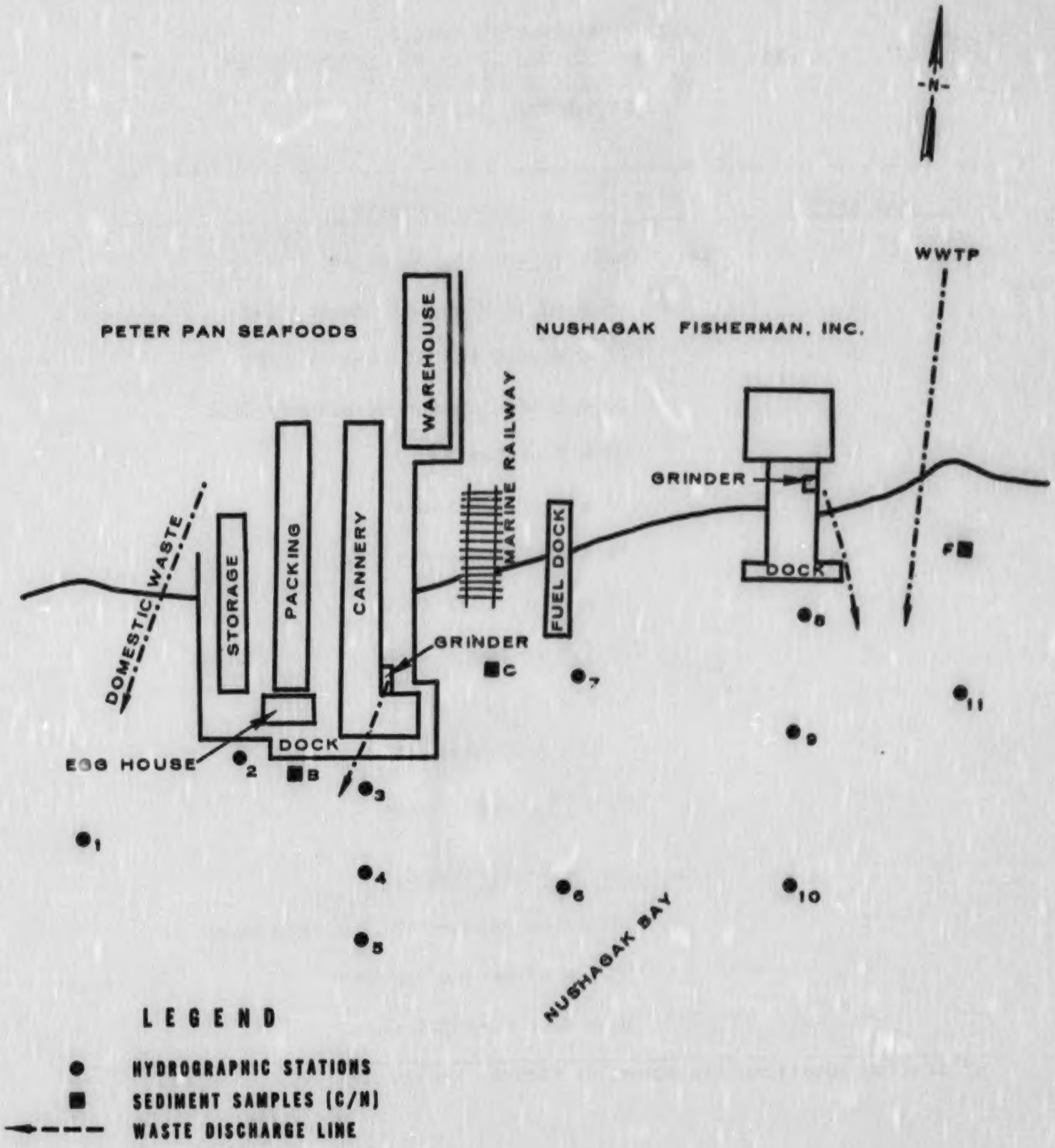
-N-
WWTP
PETER PAN SEAFOODS
NUSHAGAK FISHERMAN, INC.
WAREHOUSE
MARINE RAILWAY
GRINDER
DOMESTIC WASTE
STORAGE
PACKING
CANNERY
FUEL DOCK
DOCK
GRINDER
C
F
7
8
11
9
EGG HOUSE
DOCK
2
B
3
1
4
6
10
5
NUSHAGAK BAY
LEGEND
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)
WASTE DISCHARGE LINE

Figure VI-A11. Peter Pan Seafoods, Inc., Nushagak Fisherman, Inc., Dillingham, Alaska. Plant Layout - Station Locations

TABLE VI-A12

DESCRIPTION OF WATER QUALITY AND SEDIMENT SAMPLING STATIONS, PETER PAN SEAFOODS, INC. AND NUSHAGAK FISHERMAN, INC. DILLINGHAM, ALASKA

Map Key[a]	Description
	Water Quality Sampling Stations
1	60 m SW of W end of cannery dock
2	10 m W of W end of cannery dock
3	20 m S of midpoint of cannery dock
4	50 m S of Station 3
5	50 m S of Station 4
6	75 m E of Station 4
7	25 m SE of fuel dock
8	25 m S of midpoint of Nushagak dock
9	50 m S of Station 8
10	50 m S of Station 9
11	50 m SE of Station 8
	Sediment Sampling Stations
B	10 m S of cannery dock at egg house
C	50 m S of marine railway
F	50 m E of Nushagak dock

[a] Station locations are shown in Figure VI-A11.

Sampling was limited to high tide conditions because of extreme tidal fluctuation. Dissolved oxygen and temperatures data revealed little variation between surface and bottom points [Table VIA13]. The effect of the Nushagak River was reflected by the salinity content (0.0 ppt at all stations and depths), and the pH level (7.0 to 7.5). Sediment load was heavy as indicated by the low transparency readings (15 to 30.5 cm).

Treatment Needs

Process wastes are ground and discharged to the Nushagak River above low mean tide level. To insure adequate dispersal of these wastes, this discharge line should be extended to a level below low low tide. In addition, the area within a 30 m (100 ft) radius of the discharge pipe should be monitored for solids accumulation.

The egg house wastes are discharged to the river via the city sewer by-pass. To insure adequate dispersal, these wastes should be discharged below low mean tide. This could be accomplished most easily by diverting the wastes to the process waste grinder and discharge line.

TABLE VI-A13

SUMMARY OF WATER QUALITY
DILLINGHAM, ALASKA

Parameter[a]	Station No.[b]	High Water[c]		Parameter[a]	Station No.[b]	High Water[c]	
		Surface	Bottom			Surface	Bottom
DO, mg/l	1	10.3-10.7	9.9-10.4	Salinity, ppt	1-11	0.0	
	2	10.4-10.8	10.5-10.7	pH	1	7.0-7.5	7.0-7.5
	3	9.8-10.7	10.5-10.7		2	7.0	7.0
	4	9.8-10.7	10.0-10.2		3	7.0-7.5	7.0
	5	---	---		4	7.0-7.5	7.0
	6	10.0-10.5	10.1-10.4		5	7.0-7.5	7.0
	7	10.5-11.0	10.6-10.9		6	7.0	7.0
	8	10.5-10.8	10.7-10.8		7	7.0	7.0
	9	9.9-10.4	9.6-10.3		8	7.0	7.0
	10	---	---		9	7.0	7.0
	11	10.1-10.7	10.4-10.5		10	7.0	7.0
Temperature °C	1	12.0-14.0	12.0-13.5		11	7.0	7.0
	2	12.0-12.5	12.0-13.0	Transparency		15 to 30.5 cm	
	3	12.0-12.5	12.0-12.5				
	4	12.0-13.0	13.0				
	5	12.0-13.5	12.0-13.5				
	6	12.0-13.0	12.0-12.5				
	7	12.0-12.5	12.0-12.5				
	8	12.0-12.5	12.0-12.5				
	9	12.0-12.5	12.0-12.5				
	10	12.0-12.5	12.5-13.0				
	11	12.5-13.0	12.5				

[a] Data are reported as range of values.
[b] Station locations are shown in Figure VI-A11.
[c] No samples were collected during low water periods.

A-5 PETER PAN SEAFOODS, INC., DILLINGHAM, ALASKA

General

Peter Pan Seafoods, Inc., owns and operates a salmon cannery next to Nushagak Fisherman, Inc. on the Nushagak River in Dillingham, Alaska [Figures VI-1 and VI-A12]. The layout of the plant processing area is shown in Figure VI-A13. In addition to canning, chinook salmon are fresh frozen and shipped to Seattle, Wash. The plant was originally built in 1913 by Portland Packers and was purchased by Peter Pan Seafoods in 1964. During 1973, the cannery had 75 employees for the season lasting from 16 June to 16 July. Each year, sockeye (71 percent) and chum (20 percent) salmon are processed. The remaining 9 percent of the production mix is composed entirely of chinook salmon during odd numbered years. In even numbered years, 3 percent is chinook and the remaining 6 percent is pink salmon. The projected 1973 production was 30,000 cases. The annual production for the last five years was as follows:

Year	Annual Production (cases)
1972	47,000
1971	76,000
1970	82,000
1969	41,000
1968	70,000

Because of a reduced salmon catch, caused by reduced runs and altered fishing regulations during the 1973 season, the canneries in the area operated more economically using combines, in which one cannery processed fish for other canneries. Peter Pan Seafoods canned salmon for the New England Fish Company.

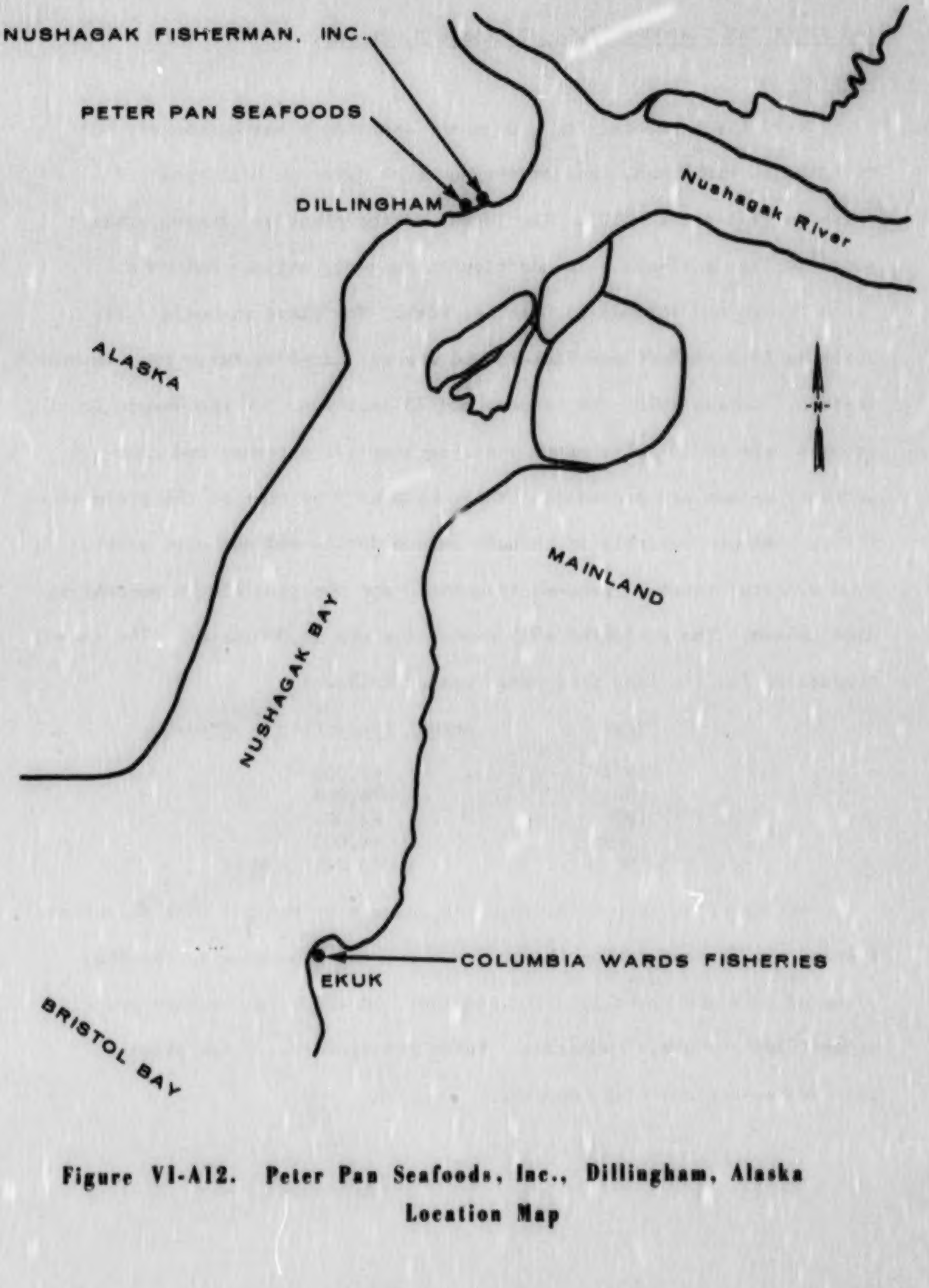
NUSHAGAK FISHERMAN, INC.
PETER PAN SEAFOODS
DILLINGHAM
Nushagak River
ALASKA
N
MAINLAND
NUSHAGAK BAY
COLUMBIA WARDS FISHERIES
EKUK
BRISTOL BAY

Figure VI-A12. Peter Pan Seafoods, Inc., Dillingham, Alaska Location Map

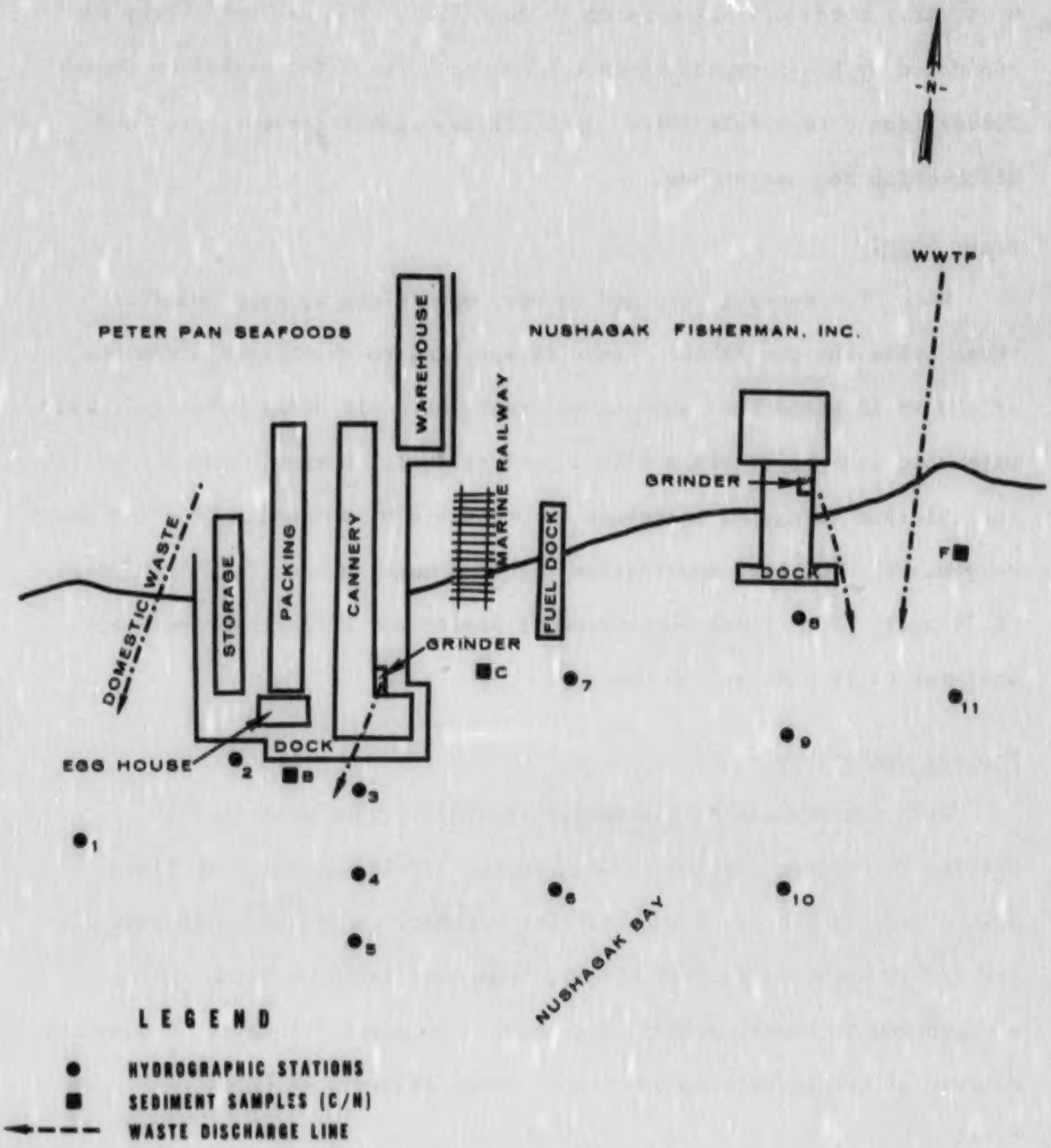
-N-
WWTP
PETER PAN SEAFOODS
NUSHAGAK FISHERMAN, INC.
WAREHOUSE
MARINE RAILWAY
GRINDER
DOMESTIC WASTE
STORAGE
PACKING
CANNERY
FUEL DOCK
DOCK
GRINDER
EGG HOUSE
DOCK
F
C
B
1
2
3
4
5
6
7
8
9
10
11
NUSHAGAK BAY
LEGEND
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)
←--- WASTE DISCHARGE LINE

Figure VI-A13. Peter Pan Seafoods, Inc., Nushagak Fisherman, Inc., Dillingham, Alaska Plant Layout - Station Locations

A Refuse Act Permit Program (RAPP) application was filed with the U. S. Army Corps of Engineers on 19 June 1971. An in-plant survey was conducted by EPA personnel from the National Field Investigation Center-Denver from 3 to 5 July 1973. Jack Gillis, superintendent, provided information and assistance.

Water Supply

Water for domestic use and cannery operations is supplied from three wells and two lakes. Water is supplied to the kitchen from one of the small wells but receives no treatment. All other water is treated with chlorine gas to yield 5 to 6 ppm residual. During cleanup operations, the chlorine dosage is increased to produce a 9 ppm residual in the cannery water. The RAPP application reported water usage of 1,097 m^3/day (0.29 mgd). The Alaska Department of Health and Welfare periodically analyzes water used at the cannery.

Process Operations

Fish are processed in a manner similar to that described in Section V. Salmon canning is done in two 1/2-lb and two 1-lb lines. Most of the fish heads are cooked for recovery of oil which is used in the 1/2-lb cans. Eggs from the egg house are cured in brine agitators, hand packed in boxes, salted, and shipped to Japan for sale. A schematic diagram of the processing and waste stream sequence is shown in Figure VI-A14.

Waste Sources

Domestic Wastes--Peter Pan Seafoods plans to treat domestic wastes in two septic tanks, that have been converted from salvaged boilers. One of

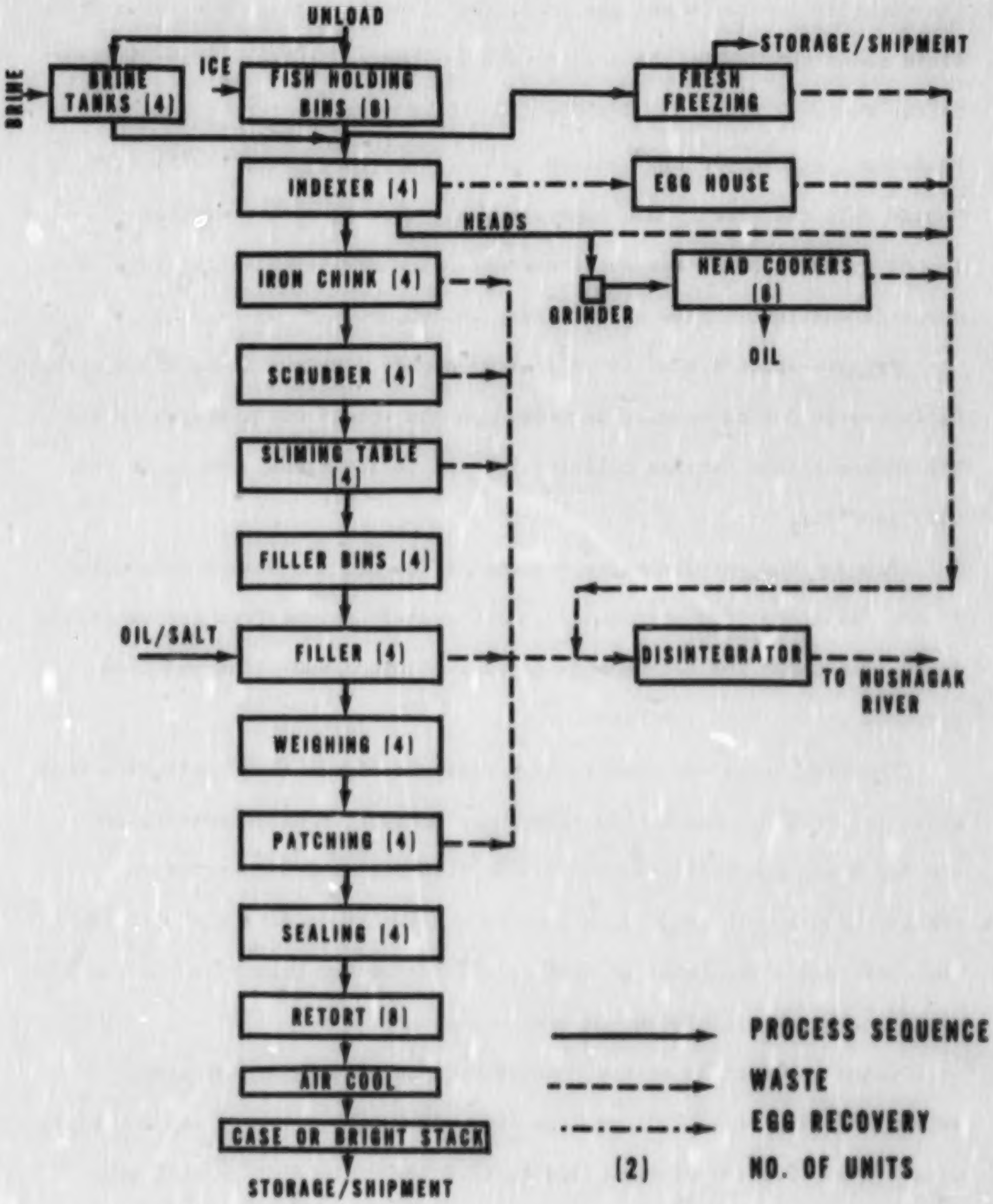
UNLOAD
BRINE
BRINE TANKS (4)
ICE
FISH HOLDING BINS (8)
STORAGE/SHIPMENT
FRESH FREEZING
INDEXER (4)
EGG HOUSE
HEADS
IRON CHINK (4)
GRINDER
HEAD COOKERS (8)
OIL
SCRUBBER (4)
SLIMING TABLE (4)
FILLER BINS (4)
OIL/SALT
FILLER (4)
DISINTEGRATOR
TO NUSHAGAK RIVER
WEIGHING (4)
PATCHING (4)
SEALING (4)
RETORT (8)
AIR COOL
CASE OR BRIGHT STACK
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(2)
NO. OF UNITS

Figure VI-A14. Peter Pan Seafoods, Inc., Dillingham, Alaska
Salmon Processing Sequence

the tanks is located under the dock, and plans have been made for a drain field under the dock. The second tank is located on a creek which flows to the Nushagak River about 150 m (500 ft) downstream from the cannery. No drain field is planned for the second tank; the effluent will discharge into the creek. All domestic wastes are presently discharged to the Nushagak River without treatment. The RAPP application reports domestic wastewater flow as 24 m^3/day (6,300 gpd).

Refuse--About 4.6 m^3 (6 yd^3) of uncompacted refuse waste are generated daily except during canning periods when the volume may increase to 9 m^3. Dillingham Refuse Service collects this waste and transports it to the city landfill.

Process Wastes--The major portion of the process wastes originate in the fish house and the cannery, with a small amount from the unloading dock. The unloading dock wastes consist of blood and slime and flow directly to the Nushagak River.

The fish house and cannery have concrete floors that facilitate easy waste collection. All wastes from these areas, the head cookers, and the egg house are collected and flumed to a disintegrator prior to discharge through a 15 cm (6 in.) line at a point about 60 m (200 ft) beyond the dock face. The point of discharge is below low mean tide. A small waste plume was visible but dissipated quickly.

Company officials stated that production of one case of canned salmon (21.8 kg or 48 lb) required about 32.7 kg (72 lb) of raw material with 1.1 kg (2.5 lb) of eggs, 3.3 kg (7.2 lb) of head oil, and 6.3 kg (14 lb) of waste materials. On this basis, 190 kkg (420,000 lb) of fish waste would have been discharged to the Nushagak River in 1973.

Waste characteristics reported in the RAPP application are shown in Table VI-A14.

Receiving Water Evaluation

The receiving water evaluation was conducted from 9 to 13 July 1973. Because of the near proximity [Figure VI-A12] of the Peter Pan Seafood plant to the Nushagak Fisherman plant [see Section VI, A-4], the receiving water evaluation is applicable to both operations. Because of the extreme tidal range and the resulting exposed river bottom at low water, the sampling was limited to high slack water periods. During the receiving water evaluation the cannery was not operating, therefore the data obtained were for normal estuarine conditions for this season of the year.

The sampling station locations during the study are shown in Figure VI-A13 and described in Table VI-A15. Dissolved oxygen and temperature indicated little variation in data values [Table VI-A16]. The effect of the Nushagak River on the estuary is reflected in the salinity measurements (saline content of 0.0 ppt for all samples), pH values which ranged between 7.0 and 7.5, and transparency readings [Table VI-A16].

Although the cannery had not been operating since 6 July, three sediments samples were obtained at low water from the tidal flats to determine the contribution of organic waste made from past operations. Sediment samples were a combination of mud and clay with the OSI below 0.5 [Table VI-A17]. This OSI level indicates aged stabilized organic

TABLE VI-A14

SALMON CANNING WASTEWATER CHARACTERISTICS[a/] PETER PAN SEAFOODS-DILLINGHAM, ALASKA

Parameter	Average[b/] Concentration	Average Load kg/day	Average Load (lb/day)
Flow, m^3/day (mgd)	1,060 (0.280)		
pH, su	6.61		
Temperature, °C (°F)	7 (45)		
BOD_5	37,500	39,630	87,375
COD	65,000	68,700	151,450
Total Solids	26,820	28,345	62,490
SS	12,660	13,400	29,564
NH_3 as N	0.85	0.9	1.9
TKN as N	2,106	2,225	4,906
NO_2 as N	1.18	1.2	2.6
NO_3 as N	1.18	1.2	2.7
Total Phosphorus as P	181	191	422
Oil & Grease	10,289	10,336	22,787

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a/ Data as reported in company RAPP application.

b/ All values reported as mg/l except where noted.

TABLE VI-A15

DESCRIPTION OF WATER QUALITY AND SEDIMENT SAMPLING STATIONS, PETER PAN SEAFOODS, INC. AND NUSHAGAK FISHERMAN, INC. DILLINGHAM, ALASKA

Map Key[a]	Description
	Water Quality Sampling Stations
1	60 m SW of W end of cannery dock
2	10 m W of W end of cannery dock
3	20 m S of midpoint of cannery dock
4	50 m S of Station 3
5	50 m S of Station 4
6	75 m E of Station 4
7	25 m SE of fuel dock
8	25 m S of mid-point of Nushagak dock
9	50 m S of Station 8
10	50 m S of Station 9
11	50 m SE of Station 8
	Sediment Sampling Stations
B	10 m S of cannery dock at egg house
C	50 m S of marine railway
F	50 m E of Nushagak dock

---

a/ Station locations are shown in Figure VI-A13.

TABLE VI-A16

SUMMARY OF WATER QUALITY DILLINGHAM, ALASKA

Parameter[a]	Station No.[b]	High Water[c]		Parameter[a]	Station No.[b]	High Water[c]	
		Surface	Bottom			Surface	Bottom
DO, mg/1	1	10.3-10.7	9.9-10.4	Salinity, ppt	1-11	0.0	
	2	10.4-10.8	10.5-10.7	pH	1	7.0-7.5	7.0-7.5
	3	9.8-10.7	10.5-10.7		2	7.0	7.0
	4	9.8-10.7	10.0-10.2		3	7.0-7.5	7.0
	5	--	--		4	7.0-7.5	7.0
	6	10.0-10.5	10.1-10.4		5	7.0-7.5	7.0
	7	10.5-11.0	10.6-10.9		6	7.0	7.0
	8	10.[illegible]-10.8	10.7-10.8		7	7.0	7.0
	9	9.9-10.4	9.6-10.3		8	7.0	7.0
	10	--	--		9	7.0	7.0
	11	10.1-10.7	10.4-10.5		10	7.0	7.0
Temperature °C	1	12.0-14.0	12.0-13.5		11	7.0	7.0
	2	12.0-12.5	12.0-13.0	Transparency		15 to 30.5 cm	
	3	12.0-12.5	12.0-12.5				
	4	12.0-13.0	13.0				
	5	12.0-13.5	12.0-13.5				
	6	12.0-13.0	12.0-12.5				
	7	12.0-12.5	12.0-12.5				
	8	12.0-12.5	12.0-12.5				
	9	12.0-12.5	12.0-12.5				
	10	12.0-12.5	12.5-13.0				
	11	12.5-13.0	12.5				

---

a/ Data are reported as range of values.
b/ Station locations are shown in Figure VI-A13.
c/ No samples were collected during low water periods.

deposits, and that grinding and discharge of wastes below low low tide in an area of adequate dispersion is an efficient, economical disposal method.

TABLE VI-A17

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS
DILLINGHAM, ALASKA

Station[a]	Depth	Organic N (Percent)	Organic C (Percent)	OSI	Bottom Type
B	Tidal Flat	0.16	1.2	0.19	Mud, Clay
C	Tidal Flat	0.05	0.5	0.02	Mud, Clay
F	Tidal Flat	0.19	1.3	0.25	Mud, Clay

[a] Station locations are shown on Figure VI-A13.

Treatment Needs

Domestic wastes were receiving no treatment at the time of the survey. This waste discharge should be connected to the Dillingham wastewater treatment plant as soon as the city resumes operation of the plant. The cannery plans to use two surplus boilers as septic tanks. These tanks could be an effective means of treatment if the effluent is contained (i.e., in leach field). If the effluent is discharged to the receiving water, Peter Pan Seafoods must provide secondary treatment of domestic wastes (40 CFR 133).

B-1 ALASKA PACKERS ASSOCIATION, INC., CHIGNIK, ALASKA

General

The Alaska Packers Association (APA), Inc., a subsidiary of Del Monte Foods, Inc. owns and operates a salmon cannery on the Alaska Peninsula at Chignik [Figure VI-1]. Constructed between 1900 and 1910, the cannery is located on the southern end of Anchorage Bay, an arm of Chignik Bay. Immediately south of the cannery, mountains rise to about 900 meters elevation. Numerous small creeks drain the area surrounding the cannery. The layout of the plant-processing area is shown in Figure VI-B1.

The cannery is open from mid-June to mid-August with 40 days of actual processing during a typical season. APA does some packing for and has a joint tendering operation with Columbia Wards Fisheries, Inc. During the 1973 season 53,000 cases* had been packed by 17 July, of which about 97 percent were red salmon. This is greater than the 26,000 cases of red salmon originally estimated for the 1973 season. The pink salmon pack generally makes up about 25 to 30 percent of the total salmon production at this cannery. However, as of 30 July the pink salmon run had not started and was considered late.

The cannery employs about 125 people. During the operating season the plant normally operates 10 to 11 hours per day, although at peak production 15 hours per day is not uncommon. Average plant production is 2,000 cases per day with a capacity of about 5,000 cases per day.

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* One case of salmon weighs 21.8 kg consisting of 48 one-pound cans.

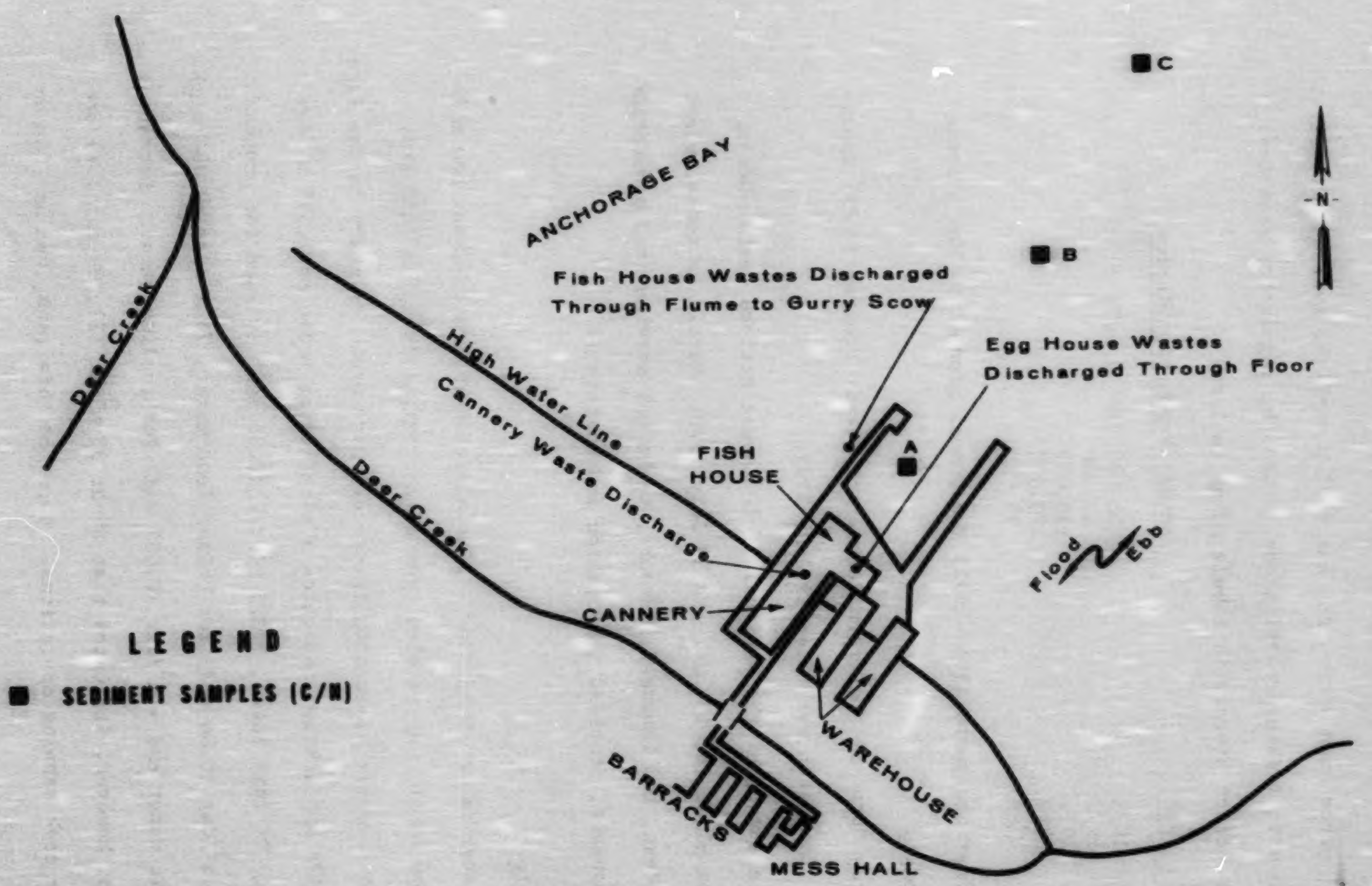
C
ANCHORAGE BAY
-N-
B
Fish House Wastes Discharged
Through Flume to Gurry Scow
Egg House Wastes
Discharged Through Floor
Deer Creek
High Water Line
Cannery Waste Discharge
Deer Creek
FISH
HOUSE
A
Flood
Ebb
CANNERY
LEGEND
SEDIMENT SAMPLES (C/N)
WAREHOUSE
BARRACKS
MESS HALL

Figure VI–B1. Alaska Packers Association, Inc., Chignik, Alaska
Plant Layout - Station Locations

The annual production since 1969 has varied with the availability of salmon and with fishing restrictions imposed by regulatory agencies. Recent production history is tabulated as follows:

Year	Annual Production (cases)
1973	53,000 (to 17 July 1973)
1972	41,000
1971	135,000
1970	170,000
1969	95,000

Over the last ten years (1962-1972) the annual production has averaged 110,000 cases.

An Army Corps of Engineers Refuse Act Permit Program (RAPP) application for the plant was filed 19 June 1971.

EPA personnel of the National Field Investigations Center-Denver visited the plant 16, 17, 24, and 30 July 1973. Harold Lahtonen, plant superintendent, and Thomas T. Takeoka, technical services and production planning manager, provided information and assistance.

Water Supply

All water is obtained from a glacial-fedlake located about one mile south of the cannery at an elevation of approximately 135 m (450 ft). There is no domestic habitation in the drainage area tributary to the lake.

The RAPP application indicates a plant water usage of 1,515 m^3/day (0.40 mgd). Of this total, 1,325 m^3/day (0.35 mgd) is used for process water, 150 m^3/day (0.04 mgd) for boiler feed water, 26 m^3/day (0.007 mgd) for domestic water and 4 m^3/day (0.001 mgd) for cooling water. Recent information, however, indicates that about 38 m^3/hr (10,000 gal./hr) are used during peak canning operations. Based on this rate, the use for an operating day would be about 380 m^3 (100,000 gal.), considerably less than the level indicated on the RAPP application.

Gas chlorination is provided for process water only. The chlorine feed rate allows a 3 to 5 ppm residual to be maintained in the process water throughout the plant. Samples are sent periodically to the Alaska Department of Health and Welfare in Anchorage for bacteriological analysis.

Process Operations

Salmon processing is accomplished in a similar manner to that employed elsewhere in Alaska [Figure V-1]. Modification to the general processing methods are shown on Figure VI-B2. The plant has two 1-lb and one 1/2-lb canning lines. No oil is added to the pack, thus, fish heads are not cooked for oil. The finished product is bright stacked and palletized for shipment.

The only expansion anticipated at this plant is the installation of cold storage facilities for halibut.

Waste Sources

Domestic Wastes--The major portion of the cannery is on collection systems that discharge to seepage pits. These are generally 2.5 to 3.0 m (8 to 10 ft) square, 2 to 2.5 m (7 to 8 ft) deep and lined on the sides with corrugated metal plates. The bottom is gravel. The seepage pits are covered with heavy planks. According to the superindendent it has never been necessary to pump out the pits. A chemical (tradename Septonic) is added to the collection system weekly to improve treatment action in the pits. There is no direct discharge from the pits.

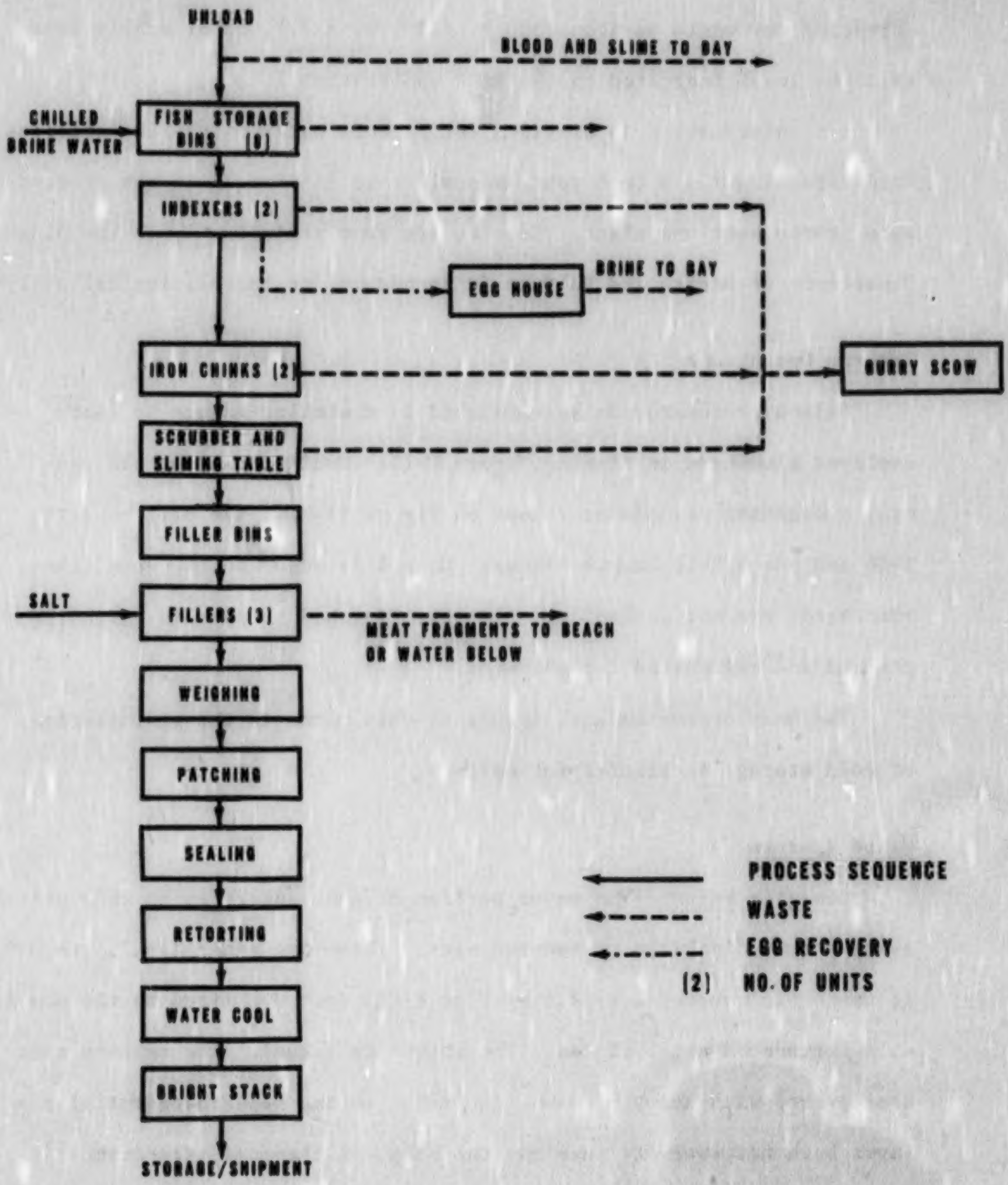
UNLOAD
BLOOD AND SLIME TO BAY
CHILLED BRINE WATER
FISH STORAGE BINS (8)
INDEXERS (2)
EGG HOUSE
BRINE TO BAY
IRON CHINKS (2)
GURRY SCOW
SCRUBBER AND SLIMING TABLE
FILLER BINS
SALT
FILLERS (3)
MEAT FRAGMENTS TO BEACH OR WATER BELOW
WEIGHING
PATCHING
SEALING
RETORTING
WATER COOL
BRIGHT STACK
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(2) NO. OF UNITS

Figure VI-B2. Salmon Canning Sequence, Alaska Packers Association, Inc., Chignik, Alaska

Raw wastes were being discharged to Deer Creek from the barracks area south of the creek during the EPA visit. Construction of a seepage pit was underway to receive these wastes.

Plant officials reported that the local residents use seepage pits for sanitary waste disposal.

Refuse--Solid wastes such as boxes, waste paper, and cans are collected and incinerated. The remaining refuse is dumped into a pit which is covered periodically. The beaches appeared relatively clean of trash and debris, more so than at other canneries visited on the peninsula.

Process Wastes--Wastes are generated at the unloading dock, fish house, and cannery. Most of the fish house wastes are conveyed from the iron chink and indexer to a flume which discharges into a gurry scow (see Section V for discussion of gurry scow). However, the fish house and the cannery have wooden floors. Wastes spill from the sliming tables, iron chink, etc., dropping to the beach or water surface below depending on the tide. The plant superintendent indicated that during down periods, workmen spray the underside of the fish house and cannery with chlorinated water to remove waste accumulations from the piling and flooring. During the EPA visit (30 July) numerous fish heads were noted along the shoreline under the docks.

The superintendent reported that the scow holds wastes from about 30,000 fish. The scow is towed out into the bay (about 0.8 km) usually once each day after processing operations have ceased. During heavy processing periods, the scow may also be emptied at noon when cannery operations are shut down for mealtime. The depth of the bay in the dumping area varies between 36 and 40 m(120 and 130 ft).

Sediment samples were collected from three selected areas on 30 July for chemical analysis [Table VI-B1].

TABLE VI-B1
CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS, CHIGNIK, ALASKA

Map Key[a]	Station	Depth (meters)	Organic N (percent)	Organic C (percent)	OSI	Bottom Type
A	Near gurry scow	3.0	0.08	0.5	0.04	Sand, Gravel Some fish wastes
B	Inside of scow dumping area	36.5	0.25	1.7	0.42	Mud (about 1.5 m thick)[b]
C	Outside of scow dumping area	36	0.26	1.9	0.49	Mud (about 1.5 m thick)

a/ Station locations are shown in Figure VI-B1.
b/ Fathometer readings were taken inside and outside the dumping area.

The low OSI values computed for the three stations indicated the bottom sediments were in a stabilized condition. The dredge sample taken near the gurry scow had a sediment layer several centimeters thick that contained primarily sand and gravel with a small amount of fish wastes. However, tidal action in the vicinity of the scow appears to minimize the buildup of the fish wastes which pass through the scow netting. Any solids buildup in this area or under the cannery is transient in nature, i.e., these wastes are flushed out with the outgoing tides.

Deer Creek [Figure VI-B1] is influenced by tides. The creek flows in a northwest direction. The mouth of the creek is about 0.8 km northwest of the cannery. A local resident complained that during high tides water may flow into Deer Creek from the southeast carrying fish heads from the bay. He stated that prior to the EPA visit, the gurry scow had been dumped about 300 m (1,000 ft) off the northeast corner of the dock instead of the middle of the bay as company officials reported. Numerous fish heads were observed in Deer Creek between the cannery and the barracks area. The local citizen also stated that problems with fish wastes occur during periods of peak production at the cannery, i.e., the scow cannot handle all the wastes. Moreover, fish wastes return to shore after the processing season ends, creating an odor problem.

Another source of process wastes is the canning operation. Wastes from the filler and washdown operations drop through the wooden floors to the beach or water below. On 24 July the plant was canning on the 1/2-lb line. The beach area beneath the filler was cluttered with fish parts. As mentioned above, these wastes are flushed out by tidal action.

The superintendent of the cannery estimated that the production of one case of canned salmon (21.8 kg or 48 lb) required about 32.7 kg (72 lb) of raw material with 1.1 kg (2.5 lb) of byproducts (eggs) and 9.5 to 10 kg (21 to 22 lb) of waste materials. On the basis of 2,000 cases produced per day, the plant would discharge from 19,000 to 20,000 kg (42,000 to 44,000 lb) of fish wastes daily into Anchorage Bay.

Treatment Needs

The present method of process waste disposal via the gurry scow and the loss of solids through the fish house and cannery floors create water quality problems that are primarily aesthetic in nature with minor accumulations of solids near the scow and the accumulation of fish solids in Deer Creek and along the shore under the decks. All process wastes must be collected, screened to remove solids (or the grid spacings in the gurry scow must be 1 mm (0.040 in.) or less), and discharged below mean low low tide. Solids which are retained on the screening devices (or in the gurry scow) can be disposed of by reduction or transported (without loss of solids) to a proper dumping area.

Domestic waste treatment by disposal to seepage pits is satisfactory providing no discharges to surface waters occur.

B-2 PETER PAN SEAFOODS, INC., FALSE PASS, ALASKA

General

Peter Pan Seafoods, Inc. owns and operates a salmon cannery at False Pass, Alaska. False Pass is located on the east end of Unimka Island which is the first island in the Aleutian chain [Figure VI-1]. Isanotski Strait, separating Unimak Island from the Alaskan Peninsula, experiences almost continual flushing action due to tidal currents. The cannery was originally constructed in 1919. The current plant layout is shown in Figure VI-B3.

The canning season in the False Pass area lasts from about 10 June to 15 August. During this time period processing takes place about 55 days or approximately 75 percent of the time. Normal employment at the cannery is about 100 people; however, due to the low catch of fish expected during 1973, the crew was only 60 to 70 persons. According to Mr. Rawlinson the maximum production capacity of the plant is approximately 5,000 cases/day. The maximum number of cases processed at time of the EPA visit was 1,500/day. The superintendent thought this would go to 2000 cases/day during the pink salmon run.

During the period 17 to 20 July 1973 the cannery operated only one-half day on 19 July (Thursday) at which time 925 cases were processed. Through 17 July 1973 almost 29,000 cases of salmon had been packed. Of this total, 69 percent were red salmon, 30 percent were chum salmon, and one percent was pink salmon. The superintendent estimated that the 1973 production including the pink salmon pack would be about 40,000

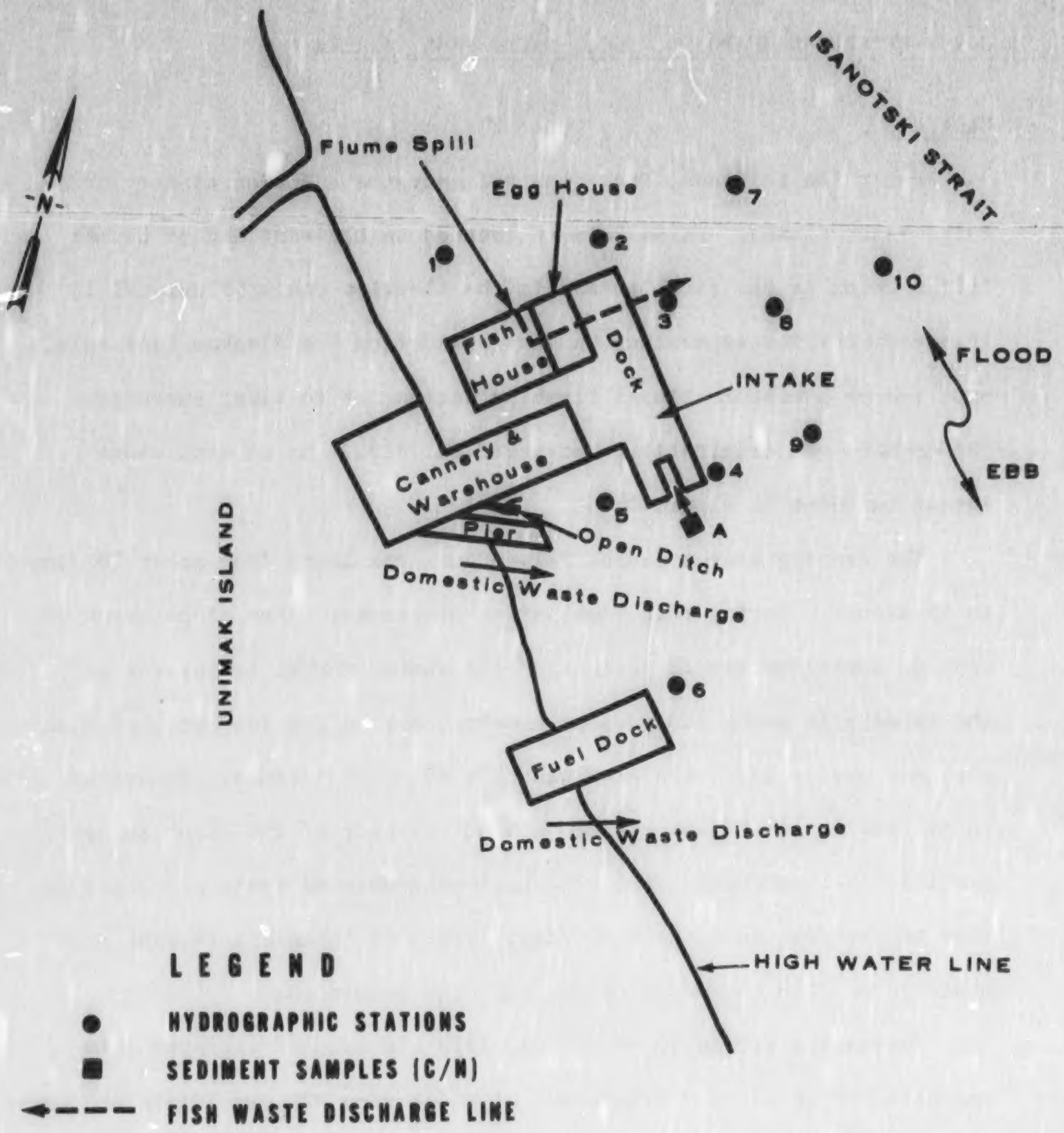
N
Flume Spill
Egg House
ISANOTSKI STRAIT
1
2
3
7
8
10
FLOOD
Fish House
Dock
INTAKE
9
EBB
Cannery & Warehouse
4
5
A
Pier
Open Ditch
Domestic Waste Discharge
UNIMAK ISLAND
6
Fuel Dock
Domestic Waste Discharge
HIGH WATER LINE
LEGEND
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)
←--- FISH WASTE DISCHARGE LINE

Figure VI-B3. Peter Pan Seafoods, Inc., False Pass, Alaska Plant Layout - Station Locations

cases. The annual production since 1967 is tabulated as follows:

Year	Annual Production (cases)
1973	29,000 (to 17 July 1973)
1972	33,000
1971	103,000
1970	159,000
1969	129,000
1968	81,000
1967	48,000

A Refuse Act Permit Program (RAPP) application dated 17 June 1971 was filed with the Army Corps of Engineers.

Personnel from EPA's National Field Investigations Center-Denver visited the plant during 17 to 20 July to evaluate waste disposal practices and process operations. Don Rawlinson, plant superintendent, provided information and assistance.

Water Supply

The Peter Pan cannery at False Pass has three separate water supplies. Salt water is used for fish handling and processing through the butchering step (i.e. cleaning). Intake pumps for the salt water system are located near the face of the dock [Figure VI-B3]. The system supplies water for brine coolers, fish holding tanks, fluming, and sliming tables. Salt water used at the sliming tables is chlorinated at a rate between 5 and 10 mg/l. Mr. Rawlinson could not provide figures on the quantity of water used in the plant. The RAPP application is inconsistent inasmuch as it lists no surface water body as a supply source.

Fresh water from a shallow (2 m) well is also used in processing.

This water is chlorinated and used in canning operations. The superintendent could not provide water use figures; however, the RAPP application indicates a ground water usage of 835 m^3/day (220,000 gpd).

The domestic water supply is taken from a spring-fed reservoir located in the mountain foothills west of the cannery. This water supply is not chlorinated. The RAPP application indicates the water use of the domestic system is 25 m^3/day (6,200 gpd).

Samples are collected from all water sources and sent monthly for bacteriological analysis to the Alaska Department of Health and Welfare in Anchorage. To date the superintendent indicated he has not received unsatisfactory results.

Process Operations

Processing at Peter Pan Seafoods at False Pass [Figure VI-B4] is typical of the general procedures employed in salmon processing in Alaska. The False Pass cannery has 5 filler lines - two 1/2-lb, two 1/4-lb, and one 1-lb.

When red salmon are processed, the heads are ground, cooked and the oil rendered. When other species are processed, the heads are ground but discharged to waste. The oil is used as an additive to one-quarter pound cans of red salmon that are sold primarily in the Eastern United States. Eggs are removed by cannery personnel under the direction of Western Alaska Enterprises personnel.

Waste Sources

Domestic Wastes--The entire cannery is on collection systems.

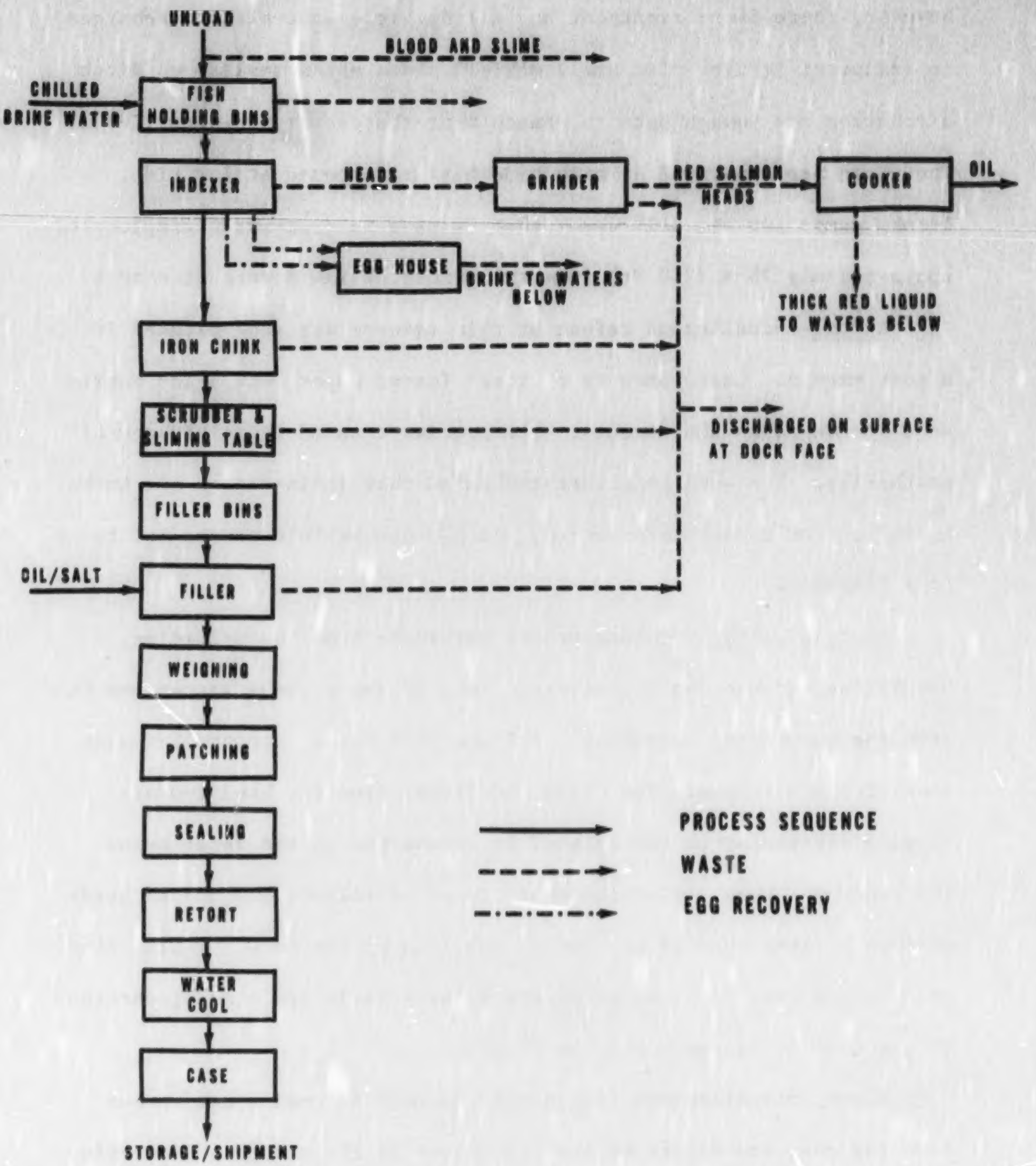
UNLOAD
BLOOD AND SLIME
CHILLED BRINE WATER
FISH HOLDING BINS
INDEXER
HEADS
GRINDER
RED SALMON HEADS
COOKER
OIL
EGG HOUSE
BRINE TO WATERS BELOW
THICK RED LIQUID TO WATERS BELOW
IRON CHINK
SCRUBBER & SLIMING TABLE
DISCHARGED ON SURFACE AT DOCK FACE
FILLER BINS
OIL/SALT
FILLER
WEIGHING
PATCHING
SEALING
RETORT
WATER COOL
CASE
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY

Figure VI–B4. Salmon Canning Sequence, Peter Pan Seafoods, Inc., False Pass, Alaska

However, there is no treatment and all domestic wastes are discharged to Isanotski Strait. Two small outfall pipes and a small open ditch discharged raw sewage onto the beach near the cannery [Figure VI-B3]. The pipes are submerged at high tide but are exposed at low tide. Intake pumps for the salt water that is used in processing are located approximately 75 m (250 ft) from the points of raw sewage discharge.

Refuse--Handling of refuse at this cannery was accomplished in a poor manner. Large amounts of trash (cans, paper, etc.) and debris were strewn along the beaches. The problem created is mainly one of aesthetics. The superindendent indicated that incinerators are to be installed for combustible wastes, and non-combustible wastes are to go to a "landfill."

Process Wastes--Process wastes originate from the unloading, butchering and canning operations. Most of the process wastes result from the butchering operation. All the fish heads from the indexing operation are ground. The thick red liquor from the head cookers (during processing of red salmon) is discharged to the water below the cannery. When processing other types of salmon, the ground heads go into a flume that discharges at the face of the dock. Tails, fins, and viscera from the iron chink and sliming table are also discharged to the face of the dock via the flume.

Blood, miscellaneous fish parts and meat fragments are washed from the concrete floors of the fish house at the end of a processing day. This washing operation accounts for appreciable quantities of wastewater. The material is washed into the flume. Meat fragments from the can filling operation drop through holes in the floor to the water below the cannery.

On 19 July during cannery operation, it was noted that ground fish wastes were being discharged to the beach under the fish house (low tide). Wastes accumulated to a depth of about one meter. The superintendent later related that the flexible discharge line from the grinder had not been placed into the flume as is the general practice. Observations after several tide cycles showed the wastes had been distributed along the beach for about 50 m. Prior to departure of EPA personnel from False Pass the wastes had either been flushed out to the Strait or eaten by the seagulls.

The flume which reportedly carries the fish wastes to the face of the dock is about 0.9 m wide, 1.0 m deep and lined with galvanized metal. About 3 m from the discharge end the flume was warped, creating a barrier for any wastes it carried. Thus, wastes were spilling over the flume side rather than at the face of the dock. During actual processing on 19 July only a small portion of the wastes were discharging at the dock face.

The estimated waste load that would result from the production of a case of salmon is 9.8 kg (21.5 lb). At an average daily production of 1500 cases the cannery would discharge 14,700 kg (32,250 lbs) of waste.

Receiving Water Evaluation

Hydrographic and chemical data were obtained daily from selected receiving water stations located in the vicinity of the cannery during both high and low tides and at the surface and near bottom depths [Table VI-B2 and Figure VI-B3]. Measurements were made at each station for DO, pH, salinity, temperature, and transparency. No significant changes and differences were observed in the DO, temperature and pH at the sampling locations during high and low tides or before, during and after processing [Table VI-B3]. Unfortunately, processing was limited to about 1/2 day (19 July) because of the minor fish catch. Thus, the impact of day-after-day processing could not be ascertained. The freshwater creek that enters the Strait northwest of the cannery influenced the surface salinity levels at some stations during high slack water [Table VI-B3].

Sediment samples collected 18 July back from the front of the dock [Station A - Figure VI-B3] revealed large accumulations of partially decomposed fish wastes. Chemical analysis of the sample showed organic carbon and nitrogen contents of 12.0 and 0.28 percent, respectively, (OSI of 3.12) which indicates that these wastes contained decomposing organic materials with the attendant high nitrogen release and oxygen demand. Sediment samples were also collected in the vicinity of Stations 1, 2, 3 (near main discharge), 4, 6, 8, and 10 that revealed bottom materials composed primarily of sand-gravel and rock. Near the fuel dock, trash consisting of cans and paper were evident on the bottom. Obviously,

Table VI-B2

DESCRIPTION OF WATER QUALITY AND SEDIMENT SAMPLING STATIONS
PETER PAN SEAFOODS, INC.
FALSE PASS, ALASKA

Map Key[a]	Description
	Water Quality Sampling Stations
1	50 m SW of Station 2
2	Dock face at the W end of the cannery dock
3	Dock face at the midpoint of the cannery dock
4	Dock face at the E end of the cannery dock
5	25 m N of the pier
6	Dock face off the fuel dock
7	50 m NE of Station 2
8	50 m NE of Station 3
9	50 m NE of Station 4
10	50 m NE of Station 8
	Sediment Sampling Stations
A	Center of the NW side of the fish tender slip

---

[a] Station locations are shown in Figure VI-B3.

TABLE VI-B3

SUMMARY OF WATER QUALITY
FALSE PASS, ALASKA

		Range of Values						Range of Values			
		High Water		Low Water				High Water		Low Water	
Parameter	Sta. No.[a/]	Surface	Bottom	Surface	Bottom	Parameter	Sta. No.[a/]	Surface	Bottom	Surface	Bottom
DO, mg/l	1	10.3-10.9	10.3-10.8	10.4-11.7	10.1-10.8	Salinity, ppt	1	12.0-20.0	21.0	19.0-20.0	22.0
	2	10.0-10.7	8.8-10.5	10.0-10.8	10.0-10.1		2	13.0-17.0	21.0	22.0	22.0
	3	10.3-10.9	10.0-10.3	10.3-10.6	10.1-10.5		3	18.0-20.0	22.0-23.0	21.0-23.0	22.0-23.0
	4	10.7	9.2-10.7	10.0-11.5	10.0-10.1		4	13.0-22.0	22.0-23.0	16.0-22.0	21.0-22.0
	5	10.6-11.8	10.0-10.4	10.7-11.3	10.1-11.0		5	9.0-10.0	21.0-23.0	12.0-14.0	20.0-22.0
	6	9.8-11.5	8.0-10.7	10.3-10.7	10.0-10.2		6	14.0-16.0	21.0-23.0	20.0-21.0	21.0-22.0
	7	10.5	9.9-10.0	10.0	9.8		7	19.0-21.0	22.0-23.0	21.0	22.0
	8	10.1-11.7	10.0-11.0	10.2	9.9		8	16.0-18.0	22.0-23.0	21.0	22.0
	9	10.0-10.6	10.0-10.3	10.2	10.1		9	19.0-20.0	22.0-23.0	19.0	22.0
	10	10.0-10.5	10.0-10.3	10.0	9.7		10	20.0-23.0	22.0-23.0	21.0	22.0
Temperature °C	1	7.0	7.0	8.0	7.5-8.0	pH	1	8.2-8.4	8.4-8.6	8.2-8.3	8.3-8.4
	2	7.0	7.0	7.5	7.5		2	8.2-8.3	8.4	8.2-8.4	8.3-8.4
	3	7.0-7.5	6.5-7.5	7.5-8.0	7.5-8.0		3	8.3	8.4	8.3-8.4	8.4-8.5
	4	7.0-8.0	6.5-7.5	7.5-8.5	7.0-7.5		4	8.3	8.4	8.3-8.4	8.4-8.5
	5	7.0-8.0	7.0-7.5	7.0-7.5	7.0-7.5		5	8.2-8.4	8.4	8.3-8.4	8.4-8.5
	6	7.0-7.5	6.5-7.5	7.0-8.0	7.0-7.5		6	8.3	8.4	8.4	8.4
	7	7.0-8.0	6.5-7.5	7.0	6.5		7	8.3-8.5	8.4-8.5	8.3	8.4
	8	7.0-7.5	6.5-7.5	7.0	7.0		8	8.3-8.4	8.4-8.5	8.3	8.4
	9	7.0-8.0	6.5-7.5	7.0	7.0		9	8.3-8.5	8.4-8.6	8.4	8.4
	10	7.0-7.5	6.5-7.5	7.0	6.5		10	8.3-8.6	8.4-8.6	8.4	8.4
Transparency		3 to 9.5 meters		2 to 8.5 meters							

---

a/ See Table VI-B2 for station descriptions.

it had been dumped from fishing boats that had docked there. The lack of fish waste deposits out from the face of the dock would indicate that these wastes are being adequately dispersed into the Strait by the tidal currents.

Treatment Needs

Secondary treatment (40 CFR 133) will be required for the domestic wastes. Because of the high water table, subsurface disposal methods such as septic tanks and leach fields or seepage pits are impractical. The superintendent indicated that an extended aeration system has been purchased. The piping for the system will be laid above ground. Wastes will then be pumped to the system. Disinfection of the final effluent will be required because the receiving waters are used as the source for processing waters. The discharged effluent must meet the limits outlined for secondary treatment.

Process wastes will need to be discharged after grinding through a closed conduit to Isanotski Strait. Better housekeeping practices for disposal of refuse wastes are needed. All combustible wastes could be incinerated. Non-combustible wastes could be disposed of in a landfill area.

B-3 PETER PAN SEAFOODS, INC., KING COVE, ALASKA

General

The Peter Pan Seafoods, Inc. cannery at King Cove, Alaska processes salmon and crab (primarily king crab). King Cove is on the south shore of the Alaska Peninsula [Figure VI-1] on a narrow spit at the mouth of King Cove Lagoon. The plant, constructed in 1911, has the layout shown in Figure VI-B5. A RAPP application dated 19 June 1971 was filed with the U. S. Army Corps of Engineers.

The plant employs about 80 to 85 people. Salmon processing occurs from 12 June to 10 August and king crab are processed beginning 15 August and lasting until the quota for the area is caught. Crab from other areas are also brought to the Peter Pan King Cove cannery for processing. In 1972 the quota for king crab was filled during November for the fishing area that encompasses King Cove.

The plant capacity for canning salmon is 5,000 to 6,000 cases/day (two 1-lb lines operating) and for crab 1,600 cases*/day. The average daily production for salmon is about 2,000 cases. During the crab processing period an average of 1,100 to 1,200 cases/day are packed. Typically the season production of salmon consists of 25 to 30 percent red salmon, 30 to 35 percent chum salmon and 40 to 45 percent pink salmon. The 1973 production was estimated to be 110,000 cases. A large production of pink salmon was anticipated during this year.

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*One case of crab weighs 5.4 kg consisting of 24 one-half pound cans.

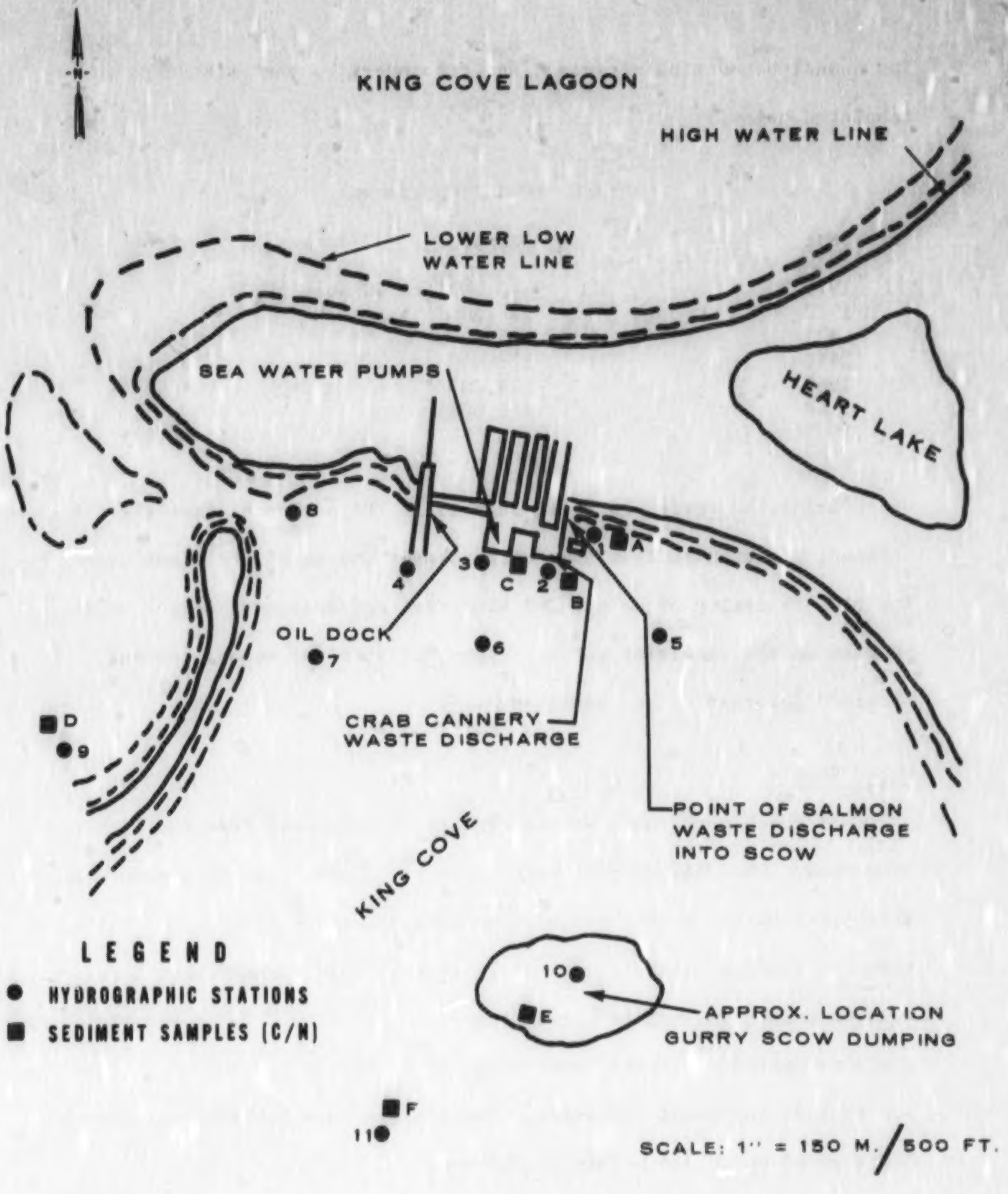
N
KING COVE LAGOON
HIGH WATER LINE
LOWER LOW WATER LINE
HEART LAKE
SEA WATER PUMPS
8
4
3
C
2
1
A
B
OIL DOCK
7
6
5
D
9
CRAB CANNERY WASTE DISCHARGE
POINT OF SALMON WASTE DISCHARGE INTO SCOW
KING COVE
LEGEND
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)
10
E
APPROX. LOCATION GURRY SCOW DUMPING
F
11
SCALE: 1" = 150 M./500 FT.

Figure VI-B5. Peter Pan Seafoods, Inc., King Cove, Alaska
Plant Layout - Station Locations

The annual production of salmon and crab over the past six years is tabulated below.

ANNUAL PRODUCTION (cases)

Year	Salmon	Crab
1973	40,000 (to 20 July 1973)	
1972	96,300	
1971	175,000	38,800
1970	228,000	103,000
1969	128,000	18,300
1968	146,000	36,600
1967	43,000	39,200

During the period 20 to 23 July 1973, EPA personnel from the National Field Investigations Center-Denver inspected the plant during the processing of salmon and king crab and conducted water quality studies on the receiving water. Lloyd Guffy, plant superintendent, provided information and assistance.

Water Supply

All fresh water used at the cannery is purchased from the City of King Cove. The city diverts water from Ram Creek, a small stream that discharges at the east shore of King Cove about one mile south of the city. A 5,680 m^3 (1.5 million gal.) reservoir is located near the diversion point and supplies peak demands in the city. Peter Pan officials estimated the fresh water usage to be 1.5 to 1.9 m^3/min (400 to 500 gpm) during plant operation. The company pays $10,800/year for the delivery of up to 3.8 m^3/min (1,000 gpm).

The city water supply is chlorinated at a point near the reservoir. However, chlorination at a rate sufficient for normal domestic use does not result in the necessary residual for use as cannery process water. Therefore, the plant provides supplemental chlorination to maintain a chlorine residual of 5 mg/l at the sliming tables and 1 mg/l at the lye wash (washing after retorting just prior to casing).

Freshwater is used in both the salmon and crab processing at Peter Pan Seafoods, Inc. In salmon processing, freshwater is used from the butchering step through canning. In crab processing freshwater is used for all operations except the initial cooking where saltwater is used. Freshwater is also used for boiler feed, domestic and washdown purposes.

The plant uses saltwater for salmon and crab handling [Figure VI-B5 shows the location of saltwater intake pumps]. Salmon are typically held in mechanically chilled seawater prior to processing. Seawater is also pumped through the live crab tank. Plant officials provided no figures on the quantity of seawater used. However, the RAPP application indicates a total water usage of 450 m^3/day (0.09 mgd) from the municipal supply.

Process Operations

Salmon Processing--A processing and waste source schematic for the salmon sequence at King Cove is shown in Figure VI-B6. Salmon are processed in a manner similar to that previously described in Section V. Milt is also removed from the salmon in this plant. Only the heads of the red salmon are cooked whole for oil which is then added to the 1/4-lb can (4 cc/can). The King Cove cannery has two 1-lb lines, one 1/2-lb line and one 1/4-lb line.

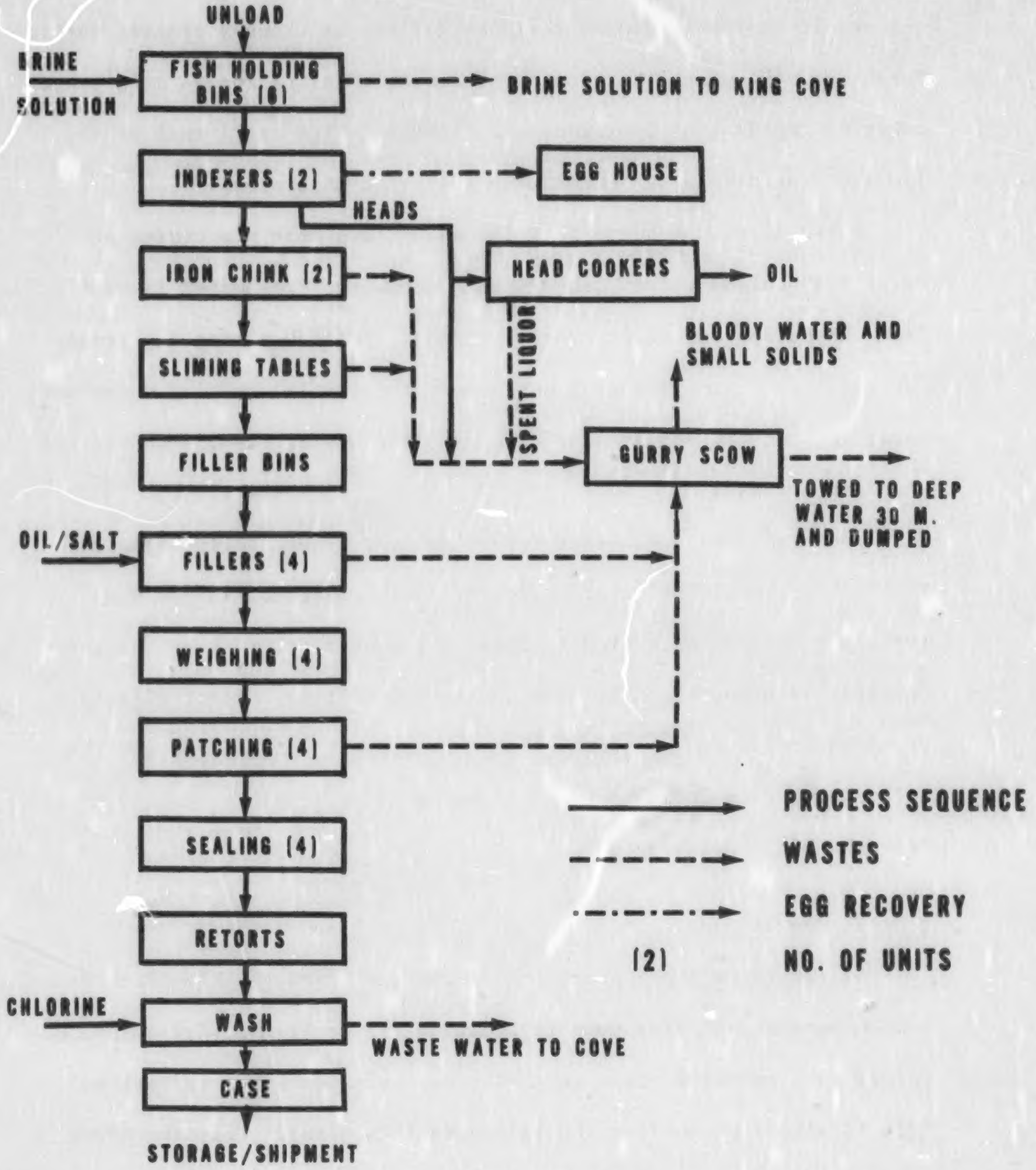
UNLOAD
BRINE SOLUTION
FISH HOLDING BINS (6)
BRINE SOLUTION TO KING COVE
INDEXERS (2)
EGG HOUSE
HEADS
IRON CHINK (2)
HEAD COOKERS
OIL
SPENT LIQUOR
SLIMING TABLES
BLOODY WATER AND SMALL SOLIDS
FILLER BINS
GURRY SCOW
TOWED TO DEEP WATER 30 M. AND DUMPED
OIL/SALT
FILLERS (4)
WEIGHING (4)
PATCHING (4)
SEALING (4)
RETORTS
CHLORINE
WASH
WASTE WATER TO COVE
CASE
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTES
EGG RECOVERY
(2)
NO. OF UNITS

Figure VI-B6. Peter Pan Seafoods, Inc., King Cove, Alaska
Salmon Processing Sequence

Eggs are brine cured and marketed by Western Alaska Enterprises. The milt, sold primarily in France, is used as a food spread. The superintendent estimated that an average of 1.1 kg (2.5 lb) of eggs are obtained per case. He had no exact figures on the weight of the milt, but estimated it would also average about 1.1 kg/case.

Crab Processing--Crabs are delivered live to the cannery. Crabs are off-loaded from the fishing boats in steel bins which hold approximately 180 kg (400 lb) each. The crabs are immediately placed in live tanks and seawater is continuously cycled through the tanks until processing begins. All crabs are canned (Section V provides typical processing details and Figure VI-B7 shows the processing sequence for this plant).

Waste Sources

Domestic Wastes--All wastes from the housing area and the kitchen are discharged to the city sewer system. Domestic wastes from the plant itself are presently discharged to seepage pits, but the company plans to connect to the municipal system.

The city uses an Imhoff tank for treating domestic wastes. The plant was inspected by EPA personnel during the survey and found to be poorly operated and maintained. The plant was constructed in 1968 with Native Aid from the Public Health Service. However, the system has never been properly operated. The concrete-lined sludge beds have never been used, nor has the clarifier received any maintenance. Sludge had increased in depth to the point that the influent was short-circuited directly across the surface to the outfall.

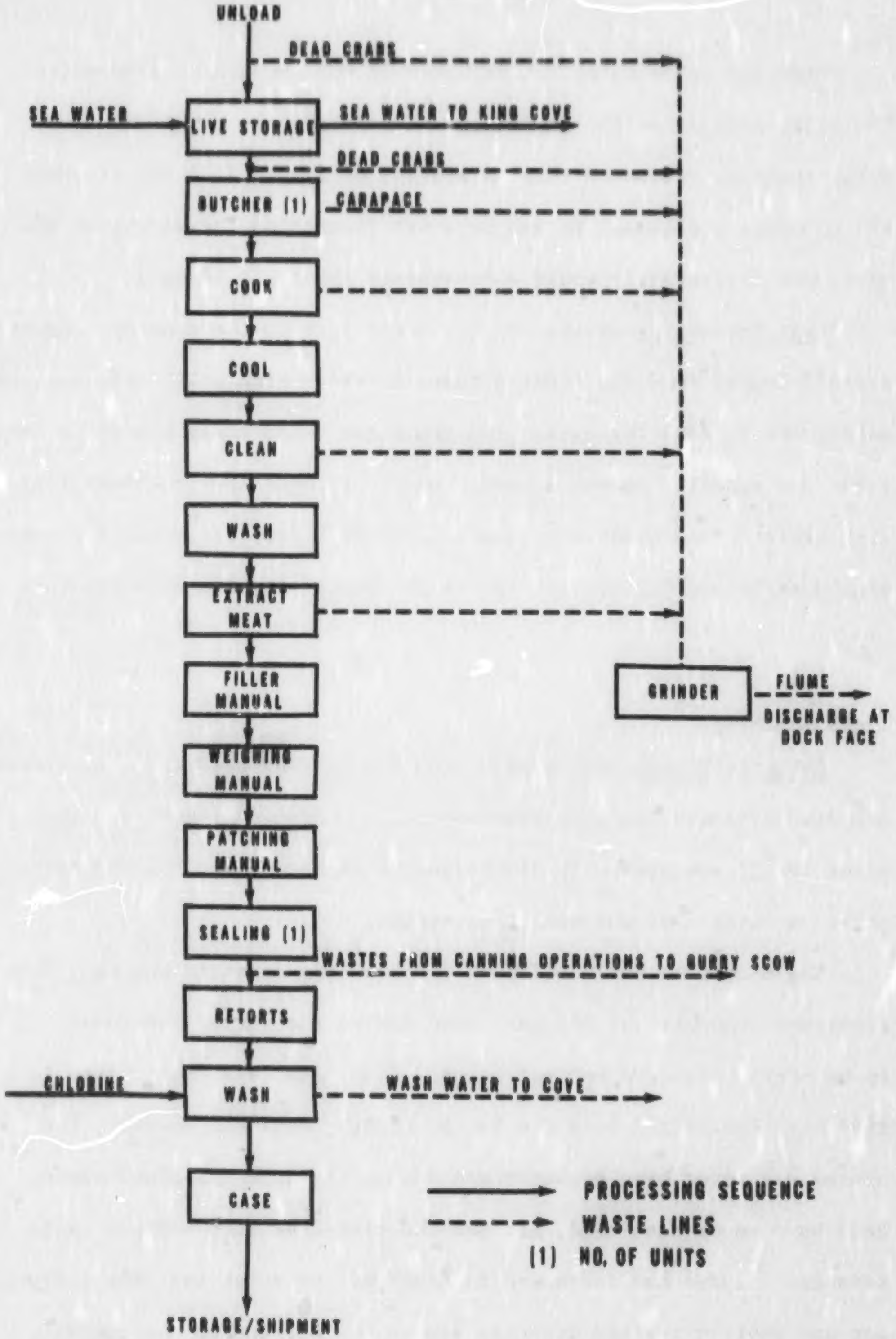
UNLOAD
DEAD CRABS
SEA WATER
LIVE STORAGE
SEA WATER TO KING COVE
DEAD CRABS
BUTCHER (1)
CARAPACE
COOK
COOL
CLEAN
WASH
EXTRACT MEAT
FILLER MANUAL
WEIGHING MANUAL
PATCHING MANUAL
SEALING (1)
WASTES FROM CANNING OPERATIONS TO GURRY SCOW
RETORTS
CHLORINE
WASH
WASH WATER TO COVE
CASE
STORAGE/SHIPMENT
GRINDER
FLUME
DISCHARGE AT DOCK FACE
PROCESSING SEQUENCE
WASTE LINES
(1) NO. OF UNITS

Figure VI-B7. Crab Processing Sequence, Peter Pan Seafoods, Inc., King Cove, Alaska

Discussion with a community official revealed that neither he or anyone else employed by the city had the knowledge of how the system operates.

Refuse--Handling of refuse wastes at this cannery and within the community of King Cove (estimated population of 400) are inadequate. The beach surrounding the Cove and the lagoon [Figure VI-B5] was strewn with trash and debris creating an extremely unsightly appearance. Trash was dumped from the boats anchored at the docks which could easily be avoided. The community is planning to construct a sanitary landfill, but no definite time schedule was provided.

Process Wastes--The wastes originate from the fish house and the cannery (both have concrete floors). Those heads not cooked for oil, plus the viscera, fins, and tails, are discharged to a central flume which in turn discharges to a wood barge (gurry scow). The cooker wastes (thick red-orange liquid) including the remainder of the heads are also discharged to the scow. The scow retains only the larger solids. During operation of the cannery the area around the scow becomes discolored. The area discolored depends on tide conditions.

Another major source of waste is the crab processing area. All crab wastes, including the dead crabs from the boats and storage tanks, are ground prior to discharge at the dock face. The discharge is to the surface (depth is about 9 to 12 m) [Figure VI-B5]. Crab wastes were visible in the immediate vicinity of the discharge. Crab canning takes place in the same building as does salmon processing. At this plant a substantial portion of the crab canning requires manual processing, i.e., filling, weighing and patching. Cannery wastes such as fillers and cleanup operation wastes are collected and discharged to the gurry scow.

The gurry scow is towed to a deepwater area that is approximately 5.2 km (3.25 miles) from the cannery [Figure VI-B5]. Dumping generally occurs at the end of the processing day. EPA personnel observed that a large amount of trash was dumped with the fish wastes from the scow. Most of the trash was carried back to shore with the tide, i.e., cardboard boxes, paper, cans, etc.

The superintendent stated that the production of one case of salmon weighing (21.8 kg or 48 lb) required 32.7 kg (72 lb) of raw material with 1.1 kg (2.5 lb) of milt and eggs and 8.6 kg (19 lb) of waste. Similarly, the production of one case of crab weighing 5.4 kg (12 lb) required from 31 to 34 kg (68 to 75 lb) of raw material with 25.4 to 28.6 kg of waste materials.

Receiving Water Evaluation

Water and sediment samples were collected at selected stations around the cannery [Table VI-B4 and Figure VI-B5]. The results showed only minor changes in the pH, salinity, and temperatures during high and low tides [Table VI-B5]. The dissolved oxygen level was consistently above 6.0 mg/l* during both high and low tides and at

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*This is the dissolved oxygen standard applicable to Alaska Marine Waters.

TABLE VI-B4

DESCRIPTION OF WATER QUALITY AND SEDIMENT SAMPLING STATIONS PETER PAN SEAFOODS, INC. KING COVE, ALASKA

Map Key[a]	Description
	Water Quality Sampling Stations
1	5 m E of scow
2	Cannery dock face
3	Crab cannery dock face
4	Face of fuel dock
5	100 m SE of Station 1
6	150 m S of Station 3
7	100 m SW of Station 4
8	Mouth of King Cove lagoon
9	Middle of South Cove
10	400 m SE of Station 1
11	450 m S of Station 3
	Sediment Sampling Stations
A	5 m E of scow dock
B	Cannery dock face of Station 2
C	Crab waste disposal area (dockside)
D	Midpoint of South Cove
E	400 m SE of Station 1 (dump area)
F	450 m S of Station 3

[a] Station locations are shown in Figure VI-B5.

TABLE VI-B5

SUMMARY OF WATER QUALITY
KING COVE, ALASKA

Parameter	Sta. No.[a]	Range of Values: High Water Surface	High Water Bottom	Low Water Surface	Low Water Bottom
DO, mg/l	1	8.1-11.3	6.5-9.5	9.3-10.0	8.3-9.1
	2	4.9-10.8	6.5-10.8	9.5-10.2	9.0-9.7
	3	10.2-11.0	8.5-10.3	9.8-10.3	8.8-9.8
	4	9.8-10.8	9.0-10.1	10.0-10.3	8.5-10.1
	5	9.8-10.7	7.6-9.7	9.6-10.1	8.2-9.6
	6	7.1-10.6	7.0-9.8	9.9-10.3	7.9-9.0
	7	6.7-10.8	4.6-10.1	10.1-10.4	7.7-9.9
	8	9.6-10.7	9.5-10.4	9.9-10.4	8.7-10.0
	9	8.9-10.6	8.0-10.3	10.0-11.0	9.1-9.6
	10	9.1-10.5	7.7-9.2	10.1-10.4	6.1-8.9
	11	9.7-12.2	6.0-9.5	9.9-11.2	7.7-8.8
Temperature °C	1	9.0-10.0	8.0-9.5	9.0-11.0	9.0-9.5
	2	8.5-9.5	7.5-9.5	9.0-9.5	8.0-9.0
	3	8.5-10.0	7.5-9.5	9.0	8.0-8.5
	4	9.0-9.5	7.5-8.0	9.0-9.5	8.0-8.5
	5	9.0-9.5	7.0-8.0	9.0-9.5	7.5-8.0
	6	8.5-9.5	7.0-8[illegible]	9.0-9.5	7.5-8.0
	7	8.5-9.5	7.5-8.0	9.0-10.0	7.5-8.5
	8	8.0-9.0	7.0-8.5	9.0-9.5	9.0
	9	8.5-9.0	8.0-8.5	9.0-10.0	8.0-9.5
	10	7.5-9.0	7.0-7.5	9.0	7.5-8.0
	11	8.0-10.0	7.0-7.5	9.0	7.5-8.0
Transparency			6.0 to 9.0 meters		

Parameter	Sta. No.[a]	Range of Values: High Water Surface	High Water Bottom	Low Water Surface	Low Water Bottom
Salinity, ppt	1	20.0-22.0	22.0-24.0	15.0-24.0	21.0-24.0
	2	21.0-22.0	22.0-23.0	21.0-24.0	22.0-24.0
	3	21.0-23.0	20.0-23.0	21.0-23.0	22.0-23.0
	4	22.0-23.0	22.0-23.0	19.0-22.0	22.0-23.0
	5	22.0-23.0	21.0-23.0	20.0-23.0	22.0-23.0
	6	21.0-23.0	20.0-23.0	18.0-22.0	22.0-23.0
	7	22.0-23.0	20.0-23.0	17.0-23.0	22.0-24.0
	8	22.0	20.0-23.0	17.0-23.0	22.0-23.0
	9	21.0-23.0	22.0-23.0	18.0-23.0	20.0-22.0
	10	20.0-23.0	21.0-23.0	21.0-23.0	22.0-23.0
	11	22.0-24.0	21.0-22.0	20.0-24.0	22.0-23.0
pH	1	7.9-8.3	8.1-8.4	7.5-7.7	7.9-8.2
	2	8.1-8.3	8.3-8.4	8.1-8.3	8.3-8.4
	3	8.3	8.4	8.3	8.3-8.4
	4	8.3	8.4	7.9-8.3	8.3-8.4
	5	8.3-8.4	8.3-8.5	8.2-8.3	8.3-8.4
	6	8.2-8.4	8.4	8.1-8.3	8.2-8.4
	7	8.2-8.4	8.3-8.4	8.2-8.3	8.3-8.4
	8	8.2-8.3	8.3-8.4	7.7-8.5	8.2-8.5
	9	8.2-8.5	8.3-8.5	8.1-8.3	8.1-8.4
	10	8.3	8.4-8.6	8.2-8.4	8.3-8.5
	11	8.3-8.4	8.5	8.1-8.3	8.3-8.5

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[a] See Table VI-B4 for station descriptions.

surface and bottom depths with two exceptions - Station 2 on the surface and Station 7 on the bottom. Both violations occurred the same date during high tide. Station 2 was near the dock and in proximity to the point of waste discharge, whereas Station 7 was over one hundred meters from the discharge point.

The sediment samples were analyzed for organic carbon and organic nitrogen content [Table VI-B6].

TABLE VI-B6

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS
KING COVE, ALASKA

Station[a]	Depth (meters)	Organic N (Percent)	Organic C (Percent)	OSI	Bottom Type
A	1.5	0.17	0.4	0.07	Fish Wastes, Sand, Gravel
B	9.8	1.41	6.0	8.46	Crab Waste, Sand, Gravel
C	9.1	1.61	15.0	24.15	Garbage, Trash, Sand, Gravel
D	11.0	0.44	4.0	1.76	Mud, Sand, Organic Detritus
E	30.5	0.98	2.4	2.35	Mud
E	30.5	1.35	2.0	2.70	Mud
F	27.0	0.25	1.0	0.48	Mud

[a] Station locations are given in Table VI-B4.

Station A, located in the immediate vicinity of the gurry scow, showed a very low OSI which indicates that the sand-gravel bottom contains little organic material. The fish waste solids which were observed with the sample are apparently being flushed out with the outgoing tides. As mentioned previously, the area around the scow becomes discolored during processing because the blood and small solids are not retained in the scow. At Stations B and C which were near the face of the dock, the OSI of the sediments indicate that active decomposition is taking place. These types of sediments, however, were confined to the area near the dock and crab waste discharge. The trash and garbage found in the sediment at Station C apparently comes from the numerous boats which tie up along the cannery dock. Sediments taken from Station E (scow dumping area) had a hydrogen sulphide odor. The OSI numbers indicate these muds are in a state of decomposition; however, no fish wastes were evident in this area. The OSI for Station F (outside the dumping area) indicates that the muds are nearly stabilized.

Treatment Needs

Secondary waste treatment plus disinfection is required in the community of King Cove. The present system is providing essentially no treatment, and even if properly operated it would provide only primary treatment. The Peter Pan Seafoods, Inc., will need to insure that the domestic wastes from its plant receive adequate treatment as described earlier.

The collection and proper disposal of refuse wastes are required for both the cannery and the community. The proposed sanitary landfill will provide a partial solution to this problem.

The use of the gurry scow for salmon processing wastes and the discharge of crab wastes at the dock face are not adequate. Collection of all process wastes with discharge below mean low low tide in the area where adequate dispersion is afforded will be required at the King Cove cannery to prevent solids accumulation and to preclude unaesthetic conditions.

B-4 PETER PAN SEAFOODS, INC., SQUAW HARBOR, ALASKA

General

Peter Pan Seafoods, Inc., owns and operates a shrimp processing plant at Squaw Harbor, Alaska. Squaw Harbor is located on the north shore of Baralof Bay on Unga Island, a large island just south of the Alaska Peninsula [Figure VI-1]. The shoreline is very steep and rugged. The entire cannery as well as bunkhouse and dining facilities are constructed on pilings. The plant was constructed in 1967 and began processing shrimp in 1968. A plant layout is shown in Figure VI-B8.

A Refuse Act Permit Program Application (RAPP) dated 19 June 1971 has been filed with the Army Corps of Engineers. The fishing season for shrimp is regulated by the Alaska Department of Fish and Game. During 1972 the season was open from 15 April 1972 until 15 February 1973. A normal operating day lasts 10 hours and shrimp are usually processed 22 to 25 days per month.

About 45 people are employed at the plant of which 38 are directly involved with processing shrimp. The processing capacity of the plant is 36.3 kkg (80,000 lb) of raw shrimp per day. On a normal 10-hour processing day 27.2 kkg (60,000 lb) of raw shrimp are processed. Production history for the period 1968 to 1972 is tabulated as follows:

Year	Annual Production (cases*)
1972	169,600
1971	150,000
1970	140,000
1969	105,000
1968	140,000

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* One case of shrimp weighs 5.4 kg consisting of 24 one-half pound cans.

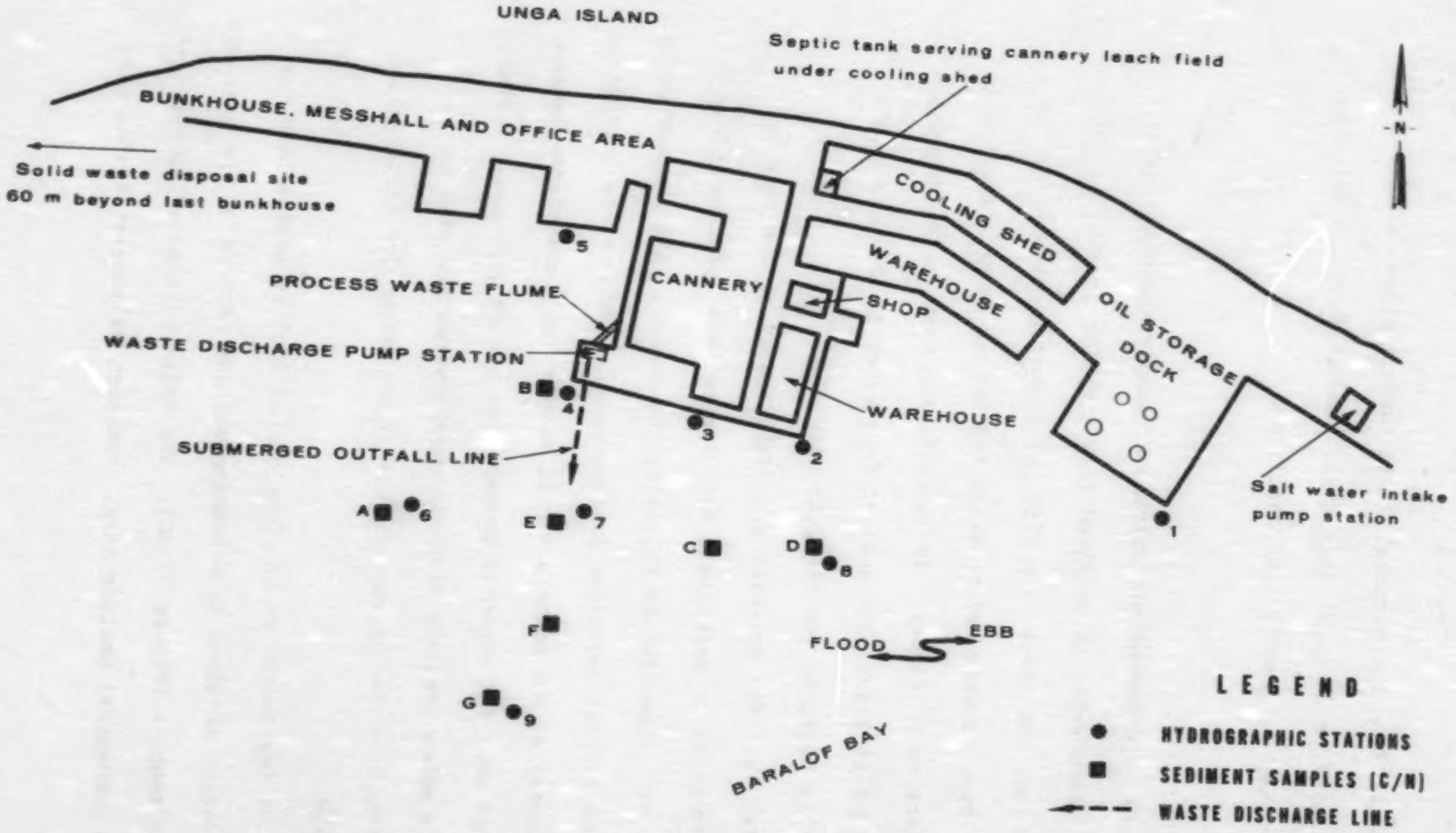
UNGA ISLAND
Septic tank serving cannery leach field under cooling shed
-N-
BUNKHOUSE, MESSHALL AND OFFICE AREA
Solid waste disposal site 60 m beyond last bunkhouse
COOLING SHED
WAREHOUSE
OIL STORAGE DOCK
CANNERY
SHOP
PROCESS WASTE FLUME
WASTE DISCHARGE PUMP STATION
WAREHOUSE
SUBMERGED OUTFALL LINE
Salt water intake pump station
1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
G
FLOOD
EBB
BARALOF BAY
LEGEND
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)
WASTE DISCHARGE LINE

Figure VI–B8. Peter Pan Seafoods, Inc., Squaw Harbor, Alaska
Plant Layout - Station Locations

EPA personnel from the National Field Investigations Center-Denver visited the plant from 27 to 31 July 1973. Reuben Evans, plant superintendent, provided information and assistance.

Water Supply

Two sources, freshwater and saltwater, supply the plant water requirements. Freshwater is obtained from a spring located to the north of the plant and about 75 m (250 ft) higher in elevation. An earth dam has been constructed to store the spring water, creating in effect a surface water supply. It is estimated that during canning operations about 19 l/sec (300 gpm) of freshwater is used. A small fraction of this would be for domestic use.

Freshwater used for processing is chlorinated at the rate of 3 to 4 mg/l in order to maintain a chlorine residual of 2 to 2.5 mg/l at the water spray immediately following the cooker. All process water used after the cooking operation is freshwater. Chlorine is introduced to the freshwater at the point where it enters the plant piping system. All freshwater used for domestic purposes is not chlorinated. Periodically water samples from the domestic water system are sent to the Alaska Department of Health and Welfare in Anchorage for bacteriological analysis.

Saltwater (estimated at 19 l/sec or 300 gpm) is used solely for processing and is obtained at a pumping station located on the east end of the plant complex [Figure VI-B8]. The major portion of salt water is used in the mechanical peeling step. However, saltwater is also used in canning.

Process Operations

Shrimp processing [Figure VI-B9] at the plant involves raw peeling, i.e., prior to blanching. The shrimp are first washed in a large tank of seawater. Loose shells float to the surface and are skimmed off by a weir-type outlet. Some of the small fish are manually removed as the washed shrimp move by conveyor belt to the peelers. After the peeled shrimp are washed, they pass through a separator which removes more shells. Then the shrimp are again washed with more shells and small fish are manually removed. Blanching (65 seconds at 97°C) completes the processing in the peeling area of the plant.

In the packing area shrimp pass over an upflow air blower which removes any remaining shells. Subsequent processing operations are similar to those described in Section V. Large cans for institutional use are hand packed and frozen. The half-pound cans are mechanically packed. All mechanically packed shrimp pass over another blower prior to canning to insure complete shell removal. After the cans are sealed they are retorted for 25 min at 116°C (240°F). Processing is completed when the cooled cans are cased for shipment.

Company officials indicated that they would begin processing fresh frozen shrimp during the 1973 season. In addition, management is considering future expansion of the plant to facilitate processing of tanner and dungeness crab.

Waste Sources

Domestic Wastes--There are no facilities for the collection, treatment, and disposal of domestic wastes originating from the

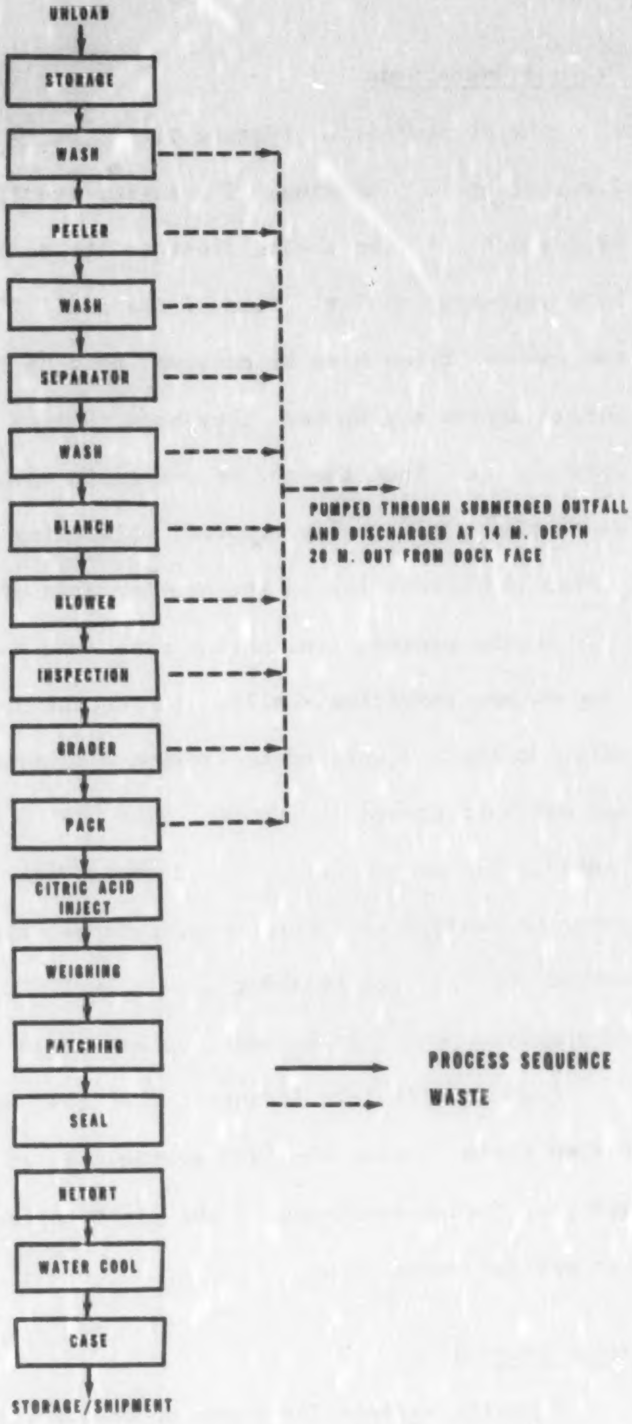
UNLOAD
STORAGE
WASH
PEELER
WASH
SEPARATOR
WASH
BLANCH
BLOWER
INSPECTION
GRADER
PACK
CITRIC ACID INJECT
WEIGHING
PATCHING
SEAL
RETORT
WATER COOL
CASE
STORAGE/SHIPMENT
PUMPED THROUGH SUBMERGED OUTFALL AND DISCHARGED AT 14 M. DEPTH 20 M. OUT FROM DOCK FACE
PROCESS SEQUENCE
WASTE

Figure VI-B9. Shrimp Processing Sequence, Peter Pan Seafoods, Inc. - Squaw Harbor, Alaska

bunkhouse, mess hall and office area. Domestic wastes from various buildings are discharged through the building floors into the water at high tide or onto the beach at low tide. Raw waste discharges from the kitchen and bunkhouse area were evident during the survey.

A small package aeration plant will be installed at this cannery.

Refuse--Refuse including wastepaper, boxes, cans, and bottles are collected and dumped approximately 60 m (200 ft) west of the plant area. Combustible solids are burned and remaining trash is periodically covered with dirt. The beach and surrounding area were relatively clean.

Process Wastes--Process wastes are derived primarily from the peeling area with additional wastes generated in the packing area. Several washing, peeling and separating steps [Figure VI-B9] account for the vast majority of waste in the form of shells, viscera, heads and small fish. These shrimp processing steps require a continuous flow of water. This water is then used to flume the wastes out of the processing area. During packing operations additional shell wastes enter the process waste stream from the blower and inspection operations.

All process wastes are conveyed from the cannery in a single flume and discharged to a sump. From the sump, wastewater is pumped through a submerged outfall line and discharged about 20 m (65 ft) from the face of the dock at a depth of 14 m (45 ft) [Figure VI-B8].

Plant officials indicated that about 18 percent of the original raw shrimp are recovered as a final product. Therefore, on an average processing day when 27.2 kkg (60,000 lb) of raw shrimp are processed, about 22.3 kkg (49,200 lb) of waste solids are discharged and 4.9 kkg (10,000 lb) of marketable shrimp produced. During the plant visit 28 and 29 July 1973 the plant was operating at the average production rate.

Receiving Water Evaluation

The quality of receiving waters was evaluated 27 to 29 July both during and after plant processing. Water and sediment samples were collected at selected stations in Baralof Bay [Figure VI-B8 and Table VI-B7]. There were no meaningful changes noted in salinity, temperature, and pH measurement [Table VI-B8]. The dissolved oxygen levels were above 6.0 mg/l, the applicable standard for Alaska Marine Waters, at all but Station 7 which is near the vicinity of the waste outfall line. At this station the oxygen levels near the bottom measured well below 6 mg/l.

The sediment samples showed that shrimp wastes were accumulating on the bottom within a radius of several hundred meters of the waste discharge point (Station E). Chemical characterization of the bottom sample [Table VI-B9] from Station E shows that very active decomposition was taking place. This would account for the lower DO values generally observed near the bottom at this location. Analysis of samples from Stations A, B, and C show the presence of decomposing waste materials. All samples had a strong hydrogen sulphide odor; however, those samples from Stations F and G showed that sediments were partially stabilized. These results would indicate that adequate dispersion of the wastes was not taking place.

TABLE VI-B7

DESCRIPTION OF WATER QUALITY AND SEDIMENT SAMPLING STATIONS PETER PAN SEAFOODS, INC. SQUAW HARBOR, ALASKA

Map Key[a]	Description
	Water Quality Sampling Stations
1	E end of fuel dock at dock face
2	E end of cannery dock at dock face
3	Midway of cannery dock at dock face
4	W end of cannery dock at dock face
5	Center of messhall at dock face
6	30 m SW of cannery dock
7	30 m E of Station 6
8	30 m S of cannery dock at "D"
9	60 m SSW of Station 7
	Sediment Sampling Stations
A	30 m SW of cannery dock near Station 6
B	W end of cannery dock near Station 4
C	25 m S of cannery dock between "E" and "D"
D	30 m S of cannery dock at Station 8
E	30 m S of dock at Station 7
F	30 m SSW of Station 7
G	30 m SSW of Station 7

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a/ Station locations are shown in Figure VI-B8.

TABLE VI-B8

SUMMARY OF WATER QUALITY
SQUAW HARBOR, ALASKA

		Range of Values						Range of Values			
		High Water		Low Water				High Water		Low Water	
Parameter	Station No.a/	Surface	Bottom	Surface	Bottom	Parameter	Station No.a/	Surface	Bottom	Surface	Bottom
DO, mg/l	1	9.2-10.7	9.0-9.9	8.8-10.2	8.4-10.0	Salinity, ppt	1	21.0-24.0	24.0	22.0-24.0	23.0-24.0
	2	9.4-10.5	9.0-9.8	8.4-10.4	8.0-10.1		2	22.0-24.0	24.0-25.0	17.0-24.0	23.0
	3	9.8-10.4	8.0-10.1	8.6-10.2	6.4-10.2		3	24.0	23.0-24.0	22.0-24.0	23.0-24.0
	4	10.0-10.5	6.8-10.2	8.4-10.3	8.0-10.4		4	24.0	23.0-24.0	23.0-24.0	23.0-24.0
	5	9.8-10.4	8.3-10.0	9.2-10.4	8.0-10.2		5	24.0	23.0-24.0	22.0-24.0	23.0-24.0
	6	10.0-10.5	7.2-9.8	8.6-10.4	7.8-10.0		6	23.0-24.0	23.0-24.0	23.0-24.0	23.0-24.0
	7	9.4-10.9	3.4-6.8	8.8-10.6	8.0-10.0		7	23.0	23.0-24.0	22.0-24.0	23.0-24.0
	8	9.8-10.5	6.0-10.1	9.0-10.4	8.2-10.3		8	24.0	23.0-24.0	23.0-24.0	23.0-24.0
	9	10.2-10.8	9.0-10.1	9.9-10.6	9.0-10.2		9	24.0	23.0-24.0	23.0-24.0	23.0-24.0
Temperature °C	1	9.5-10.5	9.0-10.0	8.5-10.0	8.5-9.5	pH	1	8.2	8.3	8.1-8.2	8.2-8.3
	2	9.5-10.0	9.0-9.5	8.5-10.0	8.5-9.0		2	7.9-8.2	8.1-8.3	7.8-8.2	8.2-8.3
	3	9.5-10.0	9.0	8.5-10.0	8.5-9.0		3	8.2-8.3	8.2-8.3	8.1-8.2	8.2-8.3
	4	9.5-10.0	9.0	8.5-9.5	8.5-9.0		4	8.2-8.3	8.2-8.3	8.1-8.3	8.2-8.3
	5	9.5-10.0	9.0-9.5	8.5-9.5	8.5-9.0		5	8.2	8.2-8.3	8.1-8.2	8.2-8.3
	6	9.0-9.5	9.0	8.5-9.5	8.5-9.0		6	8.0-8.3	8.3	8.1-8.2	8.2-8.3
	7	9.0	9.0	8.5-9.5	8.5-9.0		7	8.1-8.2	7.9-8.3	7.9-8.2	8.1-8.3
	8	9.5-10.0	9.0-9.5	8.5-9.5	8.5-9.0		8	8.2-8.3	8.3	8.1-8.2	8.2-8.3
	9	9.5	8.5-9.0	8.5-9.5	8.0-9.0		9	8.2-8.3	8.3	8.1-8.3	8.3
Transparency		3.4 to 5.5. m									

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a/ See Table VI-B7 for station descriptions.

TABLE VI-B9

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS
SQUAW HARBOR, ALASKA

Station[a]	Depth (meters)	Organic N (percent)	Organic C (percent)	OSI	Bottom Type
A	8.0	0.21	11.0	2.31	Shrimp Wastes, Organic Sludge
B	8.0	0.48	9.0	4.32	Shrimp Wastes, Organic Sludge
C	15.0	0.71	3.1	2.20	Organic Sludge, Sand, Gravel, Rock
E	13.0	0.70	11.0	7.70	Shrimp Wastes, Organic Sludge
F	19.0	0.58	1.3	0.75	Mud
G	24.0	0.28	1.6	0.45	Mud

a/ Station locations are given in Table VI-B7.

During plant operations process wastes were also visible in the receiving water. Occasionally large mats of shrimp wastes, up to one meter in diameter, would rise to the surface giving off strong obnoxious odors. These mats were broken up by wave action in a matter of minutes allowing the wastes to settle. With this exception, the receiving water and shoreline areas were essentially free of process wastes.

Treatment Needs

Adequate secondary treatment of domestic wastes is required. All untreated domestic waste discharges should be collected and given treatment to meet the required secondary level. If properly operated and maintained, a package extended aeration plant, such as that proposed for installation, should provide adequate treatment.

Waste disposal for process waters at this plant will be in accord with the effluent guidelines being developed for the shrimp processing industry.

B-5 WAKEFIELD FISHERIES, SAND POINT, ALASKA

General

Wakefield Fisheries operates a crab and shrimp processing plant at Sand Point, Alaska on the northwest side of Popof Island [Figure VI-1]. The parent company of Wakefield Fisheries is Hunt Wesson Frozen Foods, headquartered in California.

The original plant was constructed in 1947 by the Alaska Cold Storage Company. They maintained a fresh frozen operation for halibut and salmon from 1948 until 1954 when Wakefield Fisheries began a frozen king crab operation. In 1967 a new plant was constructed for processing king and tanner crabs (snow crabs). In addition, shrimp processing facilities have just been installed. The layout of the present plant facilities is shown in Figure VI-B10. About 70 people are employed in both crab and shrimp processing operations.

Crab production generally consists of 50 percent king crab and 50 percent tanner crab. In a normal day (10 hours), about 16 to 18 kkg (35,000 to 40,000 lb) of raw crab are processed. Crab processing occurs throughout the year. The king crab season for this area begins 15 August and extends through 15 January or until 2,380 kkg (5.25 million lb) are caught. King crabs are also brought from the Bering Sea and the Dutch Harbor areas which have seasons extending from 15 June to 31 March and 1 November to 15 February, respectively. The tanner crab season lasts throughout the year except from 1 to 15 August. Tanner crabs are not generally processed during the king crab season.

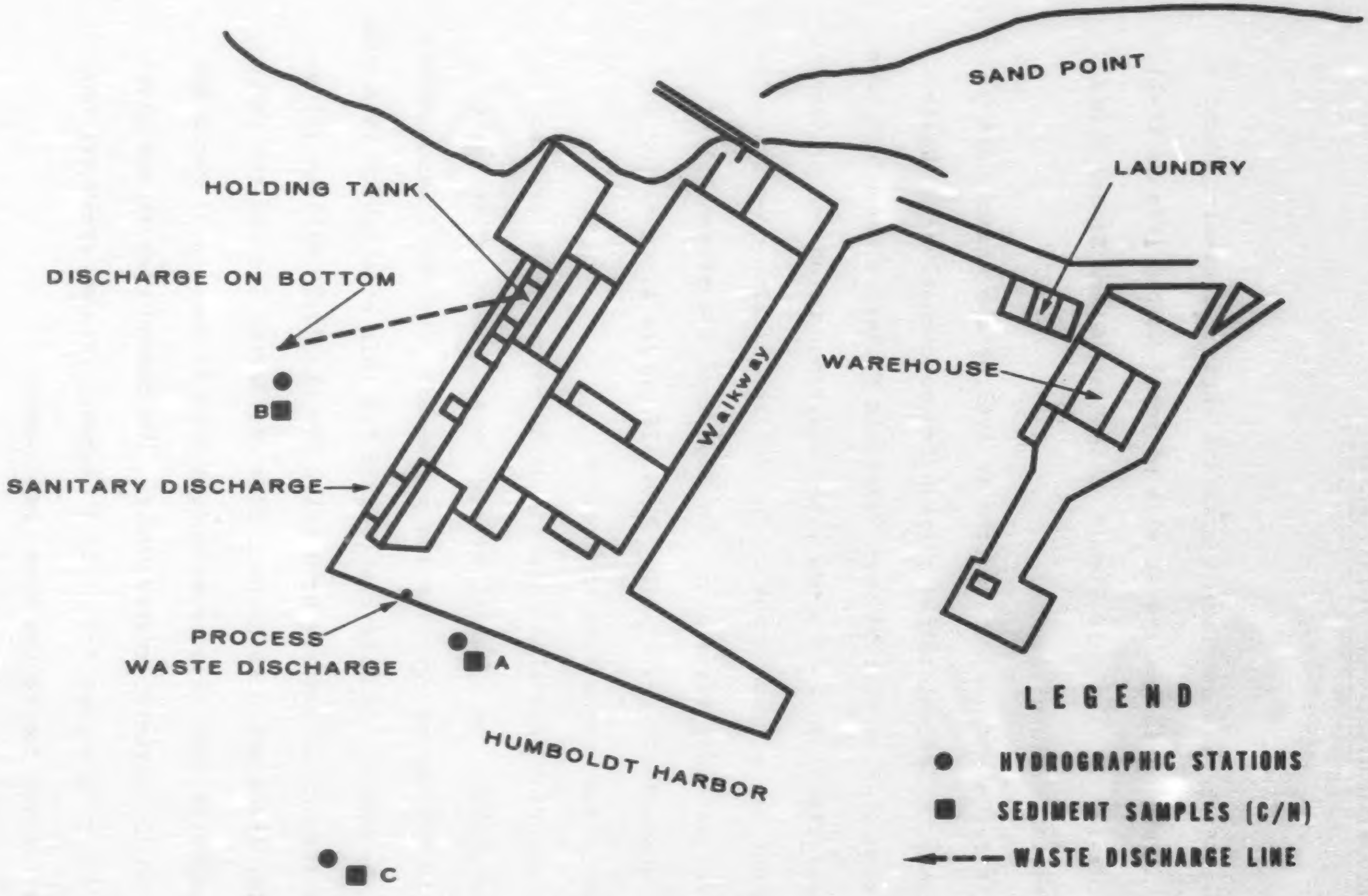
SAND POINT
HOLDING TANK
LAUNDRY
DISCHARGE ON BOTTOM
WAREHOUSE
Walkway
B
SANITARY DISCHARGE
PROCESS
WASTE DISCHARGE
A
HUMBOLDT HARBOR
C
LEGEND
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)
←--- WASTE DISCHARGE LINE

Figure VI–B10. Wakefield Fisheries, Sand Point, Alaska
Plant Layout - Station Locations

Production figures for the amount of raw crab processed during the past several years are as follows:

1972	3,175 kkg (7,000,000 lb)
1971	2,315 kkg (5,100,000 lb)
1970	2,315 kkg (5,100,000 lb)

It was estimated that 1,235 kkg (2,720,000 lb) of king crab, and 2,130 kkg (4,700,000 lb tanner crab) were processed as of 30 June 1973.

Shrimp processing occurs throughout the year except from 14 February to 15 April. The Wakefield Fisheries plant can process about 16.3 kkg (36,000 lb) of raw shrimp in a 9-hour day. The company plans to expand to two 9-hour shifts per day when shrimp become available. After several months, operation the plant had processed about 290 kkg (640,000 lb) of shrimp by 30 June.

On 26 and 27 July, EPA personnel from National Field Investigations Center-Denver visited the plant to observe processing operations and evaluate current waste disposal practices. Robert Galovin, superintendent, provided information and a plant tour.

Water Supply

Freshwater--Wakefield Fisheries owns and operates the freshwater supply system for the City of Sand Point (population 380) as well as its own processing needs. Water is obtained from Humboldt Creek and pumped through a 20 cm (8 in.) pipeline to a 570 m^3 (150,000 gal.) wood storage tank. It then flows by gravity through a 20 cm wood stave pipe to the plant. The supply system was installed in 1960 to serve the plant. Since that time additional connections for city residences have made the system inadequate in terms of treatment, storage capacity, and pressure.[6/] The only treatment being provided is chlorination which takes place at the main pumping station prior to pumping to the storage tank. Chlorine is added with the objective of maintaining 0.5 mg/l residual after passing through the pump. No additional chlorination of the freshwater is made at the plant. On 26 July the chlorine residual of the freshwater supply measured 0.1 mg/l at the plant.

Freshwater is used within the plant for cooling, ice making, washing down equipment and floors, and domestic purposes. Estimates on freshwater use are as follows:

Season	Average		Peak	
	(l/min)	(gpm)	(l/min)	(gpm)
Summer	945	250	1,325	350
Winter	340	90	795	210

Cooling water usage accounts for about 795 l/min (210 gpm) in the summer and 190 l/min (50 gpm) in the winter.[6/]

Seawater--In addition to the freshwater use, Wakefield Fisheries also uses approximately 5,700 l/min (1,500 gpm) of seawater in processing operations. However, with the addition of the shrimp processing facilities, this level of usage has increased by several hundred liters per minute. Seawater is pumped from directly below the cannery. Chlorine is added to the process water with the objective of maintaining a residual of 2.0 to 2.5 mg/l. A test on 26 July showed a chlorine residual of 2.5 mg/l.

Samples are collected and sent periodically to the Alaska Department of Health and Welfare for bacterial analyses on the water supplies. Results of these analyses are available in the main office in Bellingham, Wash.

Process Operations

Shrimp--This is the first year of operation for processing shrimp at this plant. Processing occurs in a manner similar to that described in Section V, and depicted by Figure VI-B11.

The processed shrimp are placed in 2.3 kg (5 lb) containers, vacuum sealed, frozen, and then shipped to Bellingham, Wash. where additional processing and packaging takes place.

Crab--Crab are processed [Figure VI-B12] in a manner similar to that employed at other plants in Alaska. All crab meat is packaged in 6.8 kg (15 lb) blocks. Freshwater is used for freezing and glazing the blocks that are packaged (4 per case) and then stored for shipment to Bellingham, Wash. for additional processing and packaging.

Waste Sources

Domestic Wastes--A septic tank is used to treat the domestic wastes of the cannery. The effluent from the system is discharged directly into the harbor at the edge of the dock [Figure VI-B10]. The superintendent indicated that when it is necessary to pump sludge from the tank it is their practice to wait for an outgoing tide and the right wind conditions, and then dump the sludge directly into Humboldt Harbor. A sediment sample collected near the point of discharge revealed a few shells but no sludge deposits.

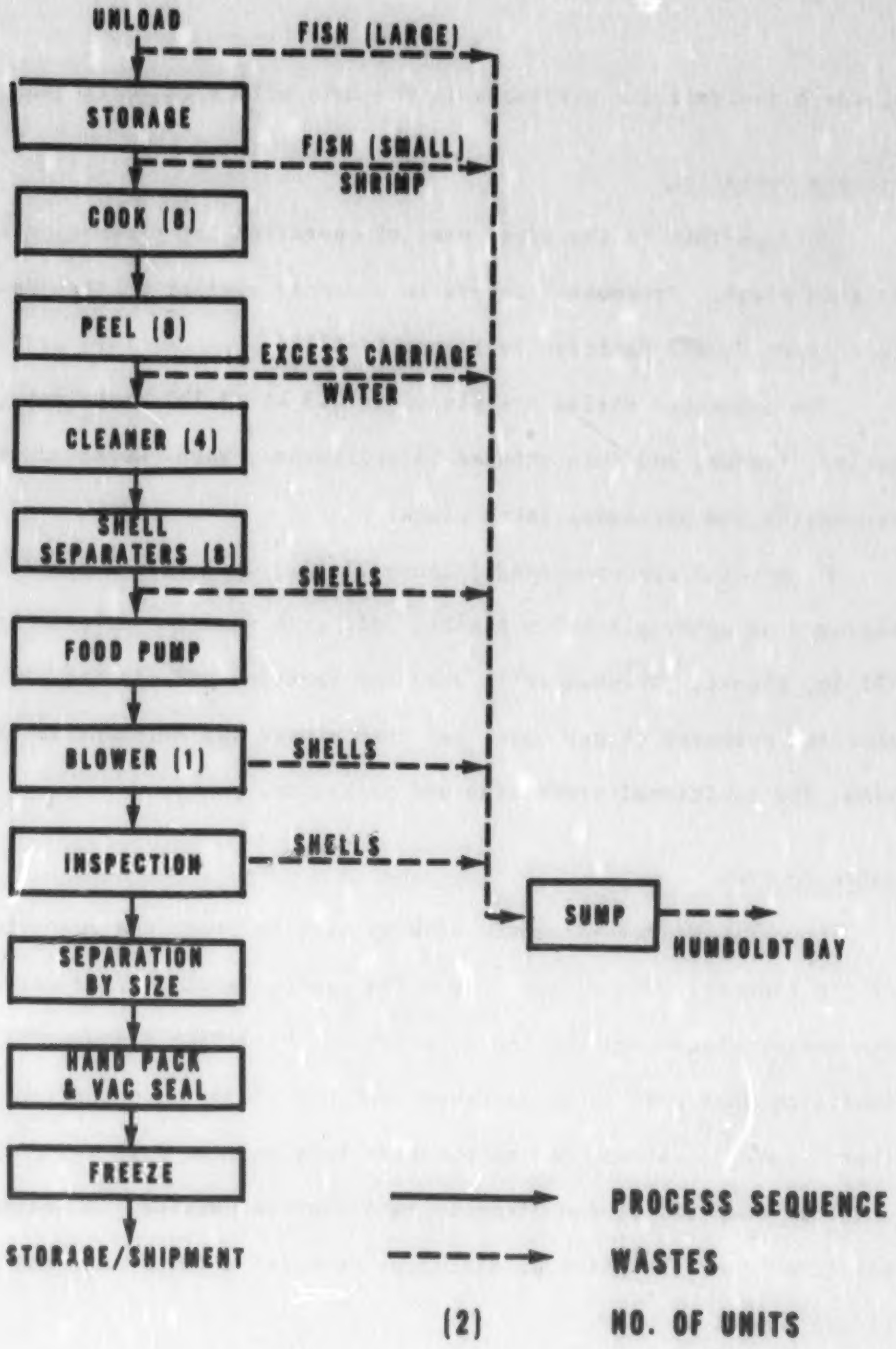
UNLOAD
FISH (LARGE)
STORAGE
FISH (SMALL)
SHRIMP
COOK (8)
PEEL (8)
EXCESS CARRIAGE
WATER
CLEANER (4)
SHELL
SEPARATERS (8)
SHELLS
FOOD PUMP
BLOWER (1)
SHELLS
INSPECTION
SHELLS
SUMP
HUMBOLDT BAY
SEPARATION
BY SIZE
HAND PACK
& VAC SEAL
FREEZE
STORARE/SHIPMENT
PROCESS SEQUENCE
WASTES
(2)
NO. OF UNITS

Figure VI-B11. Wakefield Fisheries, Sandpoint, Alaska
Shrimp Processing Sequence

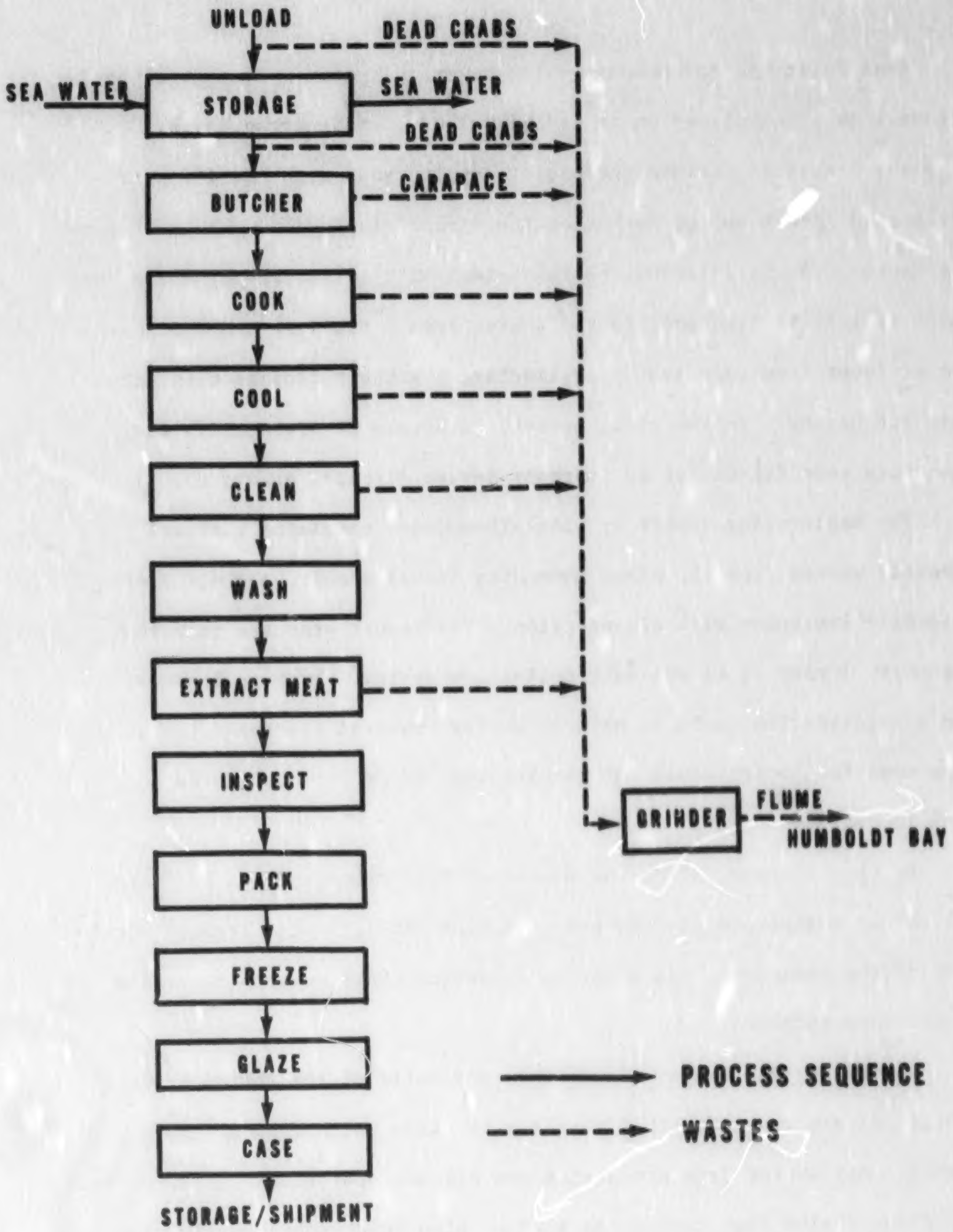
UNLOAD
DEAD CRABS
SEA WATER
STORAGE
SEA WATER
DEAD CRABS
BUTCHER
CARAPACE
COOK
COOL
CLEAN
WASH
EXTRACT MEAT
INSPECT
GRINDER
FLUME
HUMBOLDT BAY
PACK
FREEZE
GLAZE
CASE
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTES

Figure VI-B12. Wakefield Fisheries, Sandpoint, Alaska
Crab Processing Sequence

Sand Point has no community-wide sewerage system. Present sewage disposal is accomplished on an individual or a small group basis. Disposal practices include the use of septic tanks with the effluent discharged into Humboldt Harbor or the direct discharge of raw sewage to the Harbor. A small aerobic package plant with a capacity of 9.5 m^3/day (2500 gpd) gives treatment to the wastes from 8 trailers and a motel. The effluent from this system is discharged without disinfection into Humboldt Harbor. In the past, several outbreaks of diarrhea in the community were attributed to improper sewage disposal practices.

The engineering report by Linck-Thompson[6/] concludes that all domestic wastes from the plant community should receive a minimum of secondary treatment with disinfection. The report proposes that the community construct an adequate collection system, sewerage lagoons, and a chlorination basin to accomplish the required treatment. The treatment facilities would not receive cooling or process wastes from industry.

Refuse--Disposal of refuse wastes at this plant appears adequate. All refuse wastes are transported to a city landfill site located northeast of the cannery. This material is periodically covered according to the superintendent.

Shrimp Process Wastes--The floors and walls of the shrimp-processing facilities are covered with fiberglass to allow collection of process wastes. All wastes from processing and cleanup operations discharge into two floor drains that connect to a 20 cm pipe which subsequently discharges to a holding tank about 2.5 m long and deep, and 1 m wide

[Figure VI-B10]. Wastes are pumped from the tank through a discharge line, submerged about 11 m, to a distance about 150 m from the dock. One pump will empty the holding tank in less than 60 sec. The superintendent related that when pumping starts, air entrapped in the discharge line raises it to the water surface. The company plans to anchor the pipeline to the Harbor bottom with concrete blocks.

A sediment sample collected near the end of the discharge pipe [Station B, Figure VI-B10] indicated a mud-sand bottom with no shrimp wastes present. This would indicate that these wastes were being dispersed by tide action. The OSI of 0.20 [Table VI-B10] indicates that the sediments were in a stable condition. Samples collected in the near vicinity of the point of discharge were similar in character.

TABLE VI-B10

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS
SAND POINT, ALASKA

Station[a]	Depth (meters)	Organic N	Organic C	OSI	Bottom Type
		(percent)			
A	6.0	0.85	6.0	5.10	Crab shell, Mud, Sand
B	10.0	0.17	1.2	0.20	Mud, Sand
C	11.0	0.08	0.5	0.04	Mud, Sand

[a] Station locations are shown in Figure VI-B10.

The estimated daily waste load from shrimp processing is 13.2 to 13.6 kkg (29,000 to 30,000 lb). This waste load is based on the processing of 16.3 kkg (36,000 lb)/day of raw shrimp. The final product recovered is about 2.8 kkg (6,000 lb) or 17 to 18 percent. If the plant goes to the two 9-hour shifts per day as planned, this waste load will double.

Crab Process Wastes--The crab processing plant has concrete floors to facilitate waste collection. All crab wastes from the butchering, cleaning, and related processes pass through a Red Goat Grinder to a central flume that discharges at the face of the dock [Figure VI-B10] where the water depth is about 10 m. During the EPA visit, a portion of the crab process wastes was spilling under the dock. Dredge samples taken at the face of the dock [Station A, Figure VI-B10] revealed a large buildup of shell fragments. The OSI of 5.10 indicated that the bottom deposits were not stable but were actively decomposing. However, the buildup of bottom solids did not extend more than a couple of meters from the face of the dock. Samples taken about 45 m directly in front of the dock [Station C] contained no shells and indicated that sediments were in a stable condition.

No figures were provided for the amount of waste generated per kilogram of live crab processed. However, based on statistics collected from other plants, this waste load is estimated to be about 82 to 84 percent of the total crab weight processed, i.e., 16 to 18 percent of the live crab weight is processed as a marketable product. With this assumption the daily waste load from Wakefield Fisheries for crab processing varies from about 13.2 to 15.4 kkg (29,000 to 34,000 lb), based on a live crab weight processing rate of 15.9 to 18.1 kkg (35,000 to 40,000 lb)/day.

Future disposal plans of the company call for the crab processing wastes to go to the holding tank now receiving only shrimp process wastes.

Treatment Needs

Adequate secondary treatment (40 CFR 133) for the plant domestic wastes and those from the community of Sand Point is necessary. The proposed treatment system outlined in the preliminary engineering report by Linck-Thompson should solve the problem of raw and inadequately treated domestic wastes. These wastes are now being discharged to waters of Popof Strait and eliminate or decrease the potential for contamination of the seawater used for processing.

Disposal of process waste for this plant must be in accord with the effluent guidelines being developed for the crab and shrimp industry.

C-1 ALASKA SEAFOODS, INC., HOMER, ALASKA

General

Alaska Seafoods, Inc. owns and operates a crab and shrimp processing facility at the end of the Homer Spit in Homer, Alaska [Figures VI-2 and VI-C1]. In 1964 the company was incorporated and the plant was built. The plant employs about 150 people and operates on two 8-hr shifts per day. The number of processing days each season varies with the quantity of seafood caught. The plant layout is shown in Figure VI-C2. A Refuse Act Permit Program (RAPP) application was filed with the U.S. Army Corps of Engineers.

The canning process ceased in 1970; freezing is now the only operation. Although no definite commitments have been made, the company plans to expand its freezing operations in the near future, and may return to canning if the market becomes attractive. The company distributes crab and shrimp under its own brand name, Hi-North Brand, with brokers in New York, Hawaii, and on the West Coast.

Anticipated production in 1973 was 1,130 kkg (2.5 million lb) of snow crab, 680 kkg (1.5 million lb) of king crab, 91 kkg (200,000 lb) of dungeness crab, and 2,270 kkg (5 million lb) of pink shrimp. Although production figures were not made available for past years, the company estimates that production has increased about 15 to 20 percent per year. At maximum capacity, the plant can process 18 kkg (40,000 lb) of shrimp and 22.7 kkg (50,000 lb) of crab per day. This year, the plant also processed 4.5 kkg (10,000 lb) of fresh-frozen sockeye salmon.

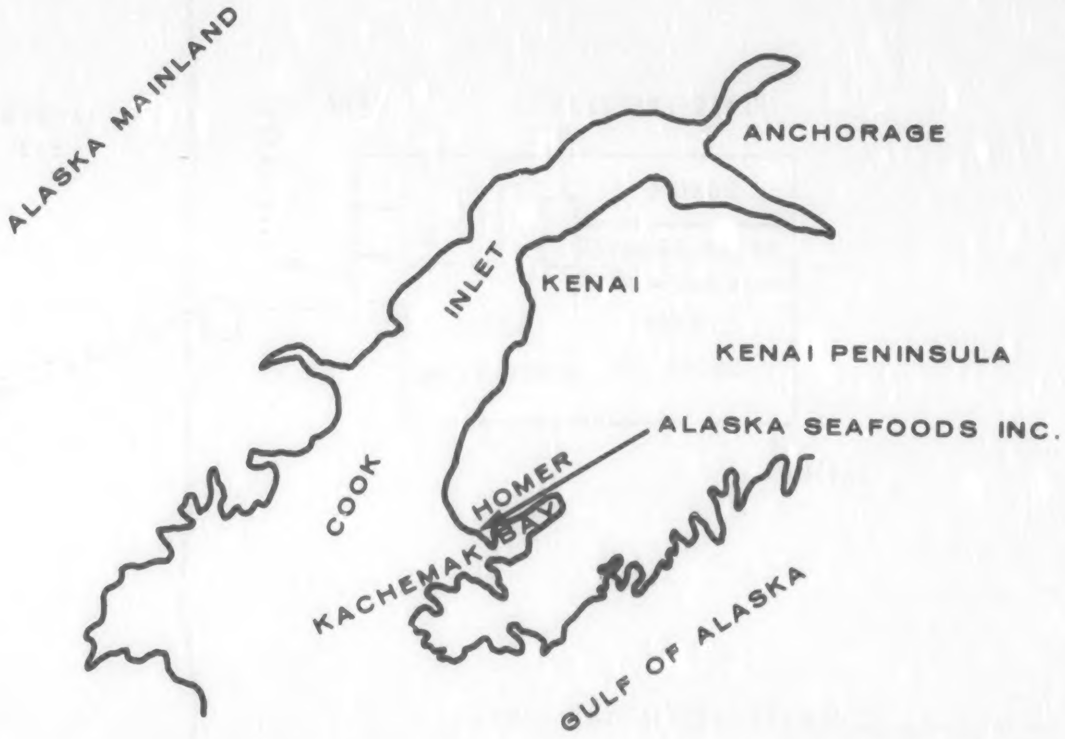
ALASKA MAINLAND
ANCHORAGE
COOK INLET
KENAI
KENAI PENINSULA
ALASKA SEAFOODS INC.
HOMER
KACHEMAK BAY
GULF OF ALASKA

Figure VI–C1. Alaska Seafoods, Inc., Homer, Alaska Location Map

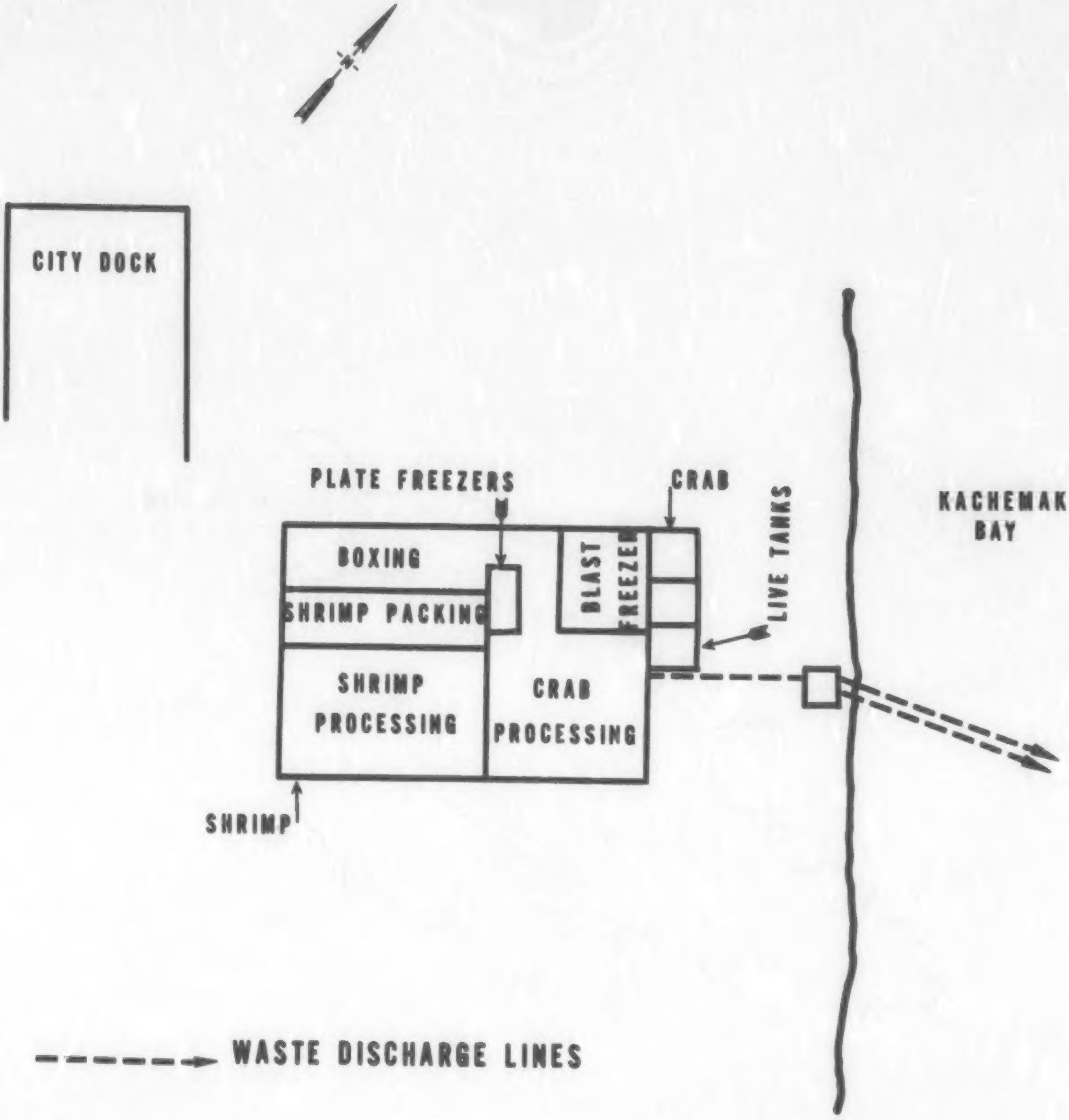
CITY DOCK
PLATE FREEZERS
CRAB
LIVE TANKS
KACHEMAK BAY
BOXING
SHRIMP PACKING
BLAST FREEZER
SHRIMP PROCESSING
CRAB PROCESSING
SHRIMP
WASTE DISCHARGE LINES

Figure VI–C2. Alaska Seafoods, Inc., Homer , Alaska
Plant Layout

EPA personnel from the National Field Investigations Center-Denver visited the facility and conducted an in-plant survey on 25 July 1973. However, receiving water quality evaluation was not conducted. Bill Miller, president, and Harry Gregorie, plant superintendent, provided information and assistance.

Water Supply

Water for domestic purposes is purchased from the city of Homer. In June 1973, 9,840 m^3/day (2.6 mgd) were used; however, the quantity varies each month. Process water used for the shrimp peelers, live-crab tanks, and cleanup is obtained from four saltwater wells: two wells are 21 m (70 ft) deep and two are 34 m (110 ft) deep. Each of the four peelers uses about 3 l/sec (50 gpm); the amount used in cleanup and live-crab tanks which are operated on a flow-through basis is unknown. According to the RAPP application about 500 m^3 (132,600 gal.) of saltwater and 90 m^3 (23,800 gal.) of freshwater are used daily for processing and domestic purposes.

Process Operations

Shrimp--Shrimp are received at the Homer City dock and transferred by brailler net from the fishing boat to open bed trailers for transport to the plant. A scale is attached between the hoist line and the brailler net to determine live-shrimp weight. At the plant, the shrimp are unloaded by hand onto a conveyor which carries the shrimp to the processing area. Processing [Figure VI-C3] is accomplished in a manner similar to

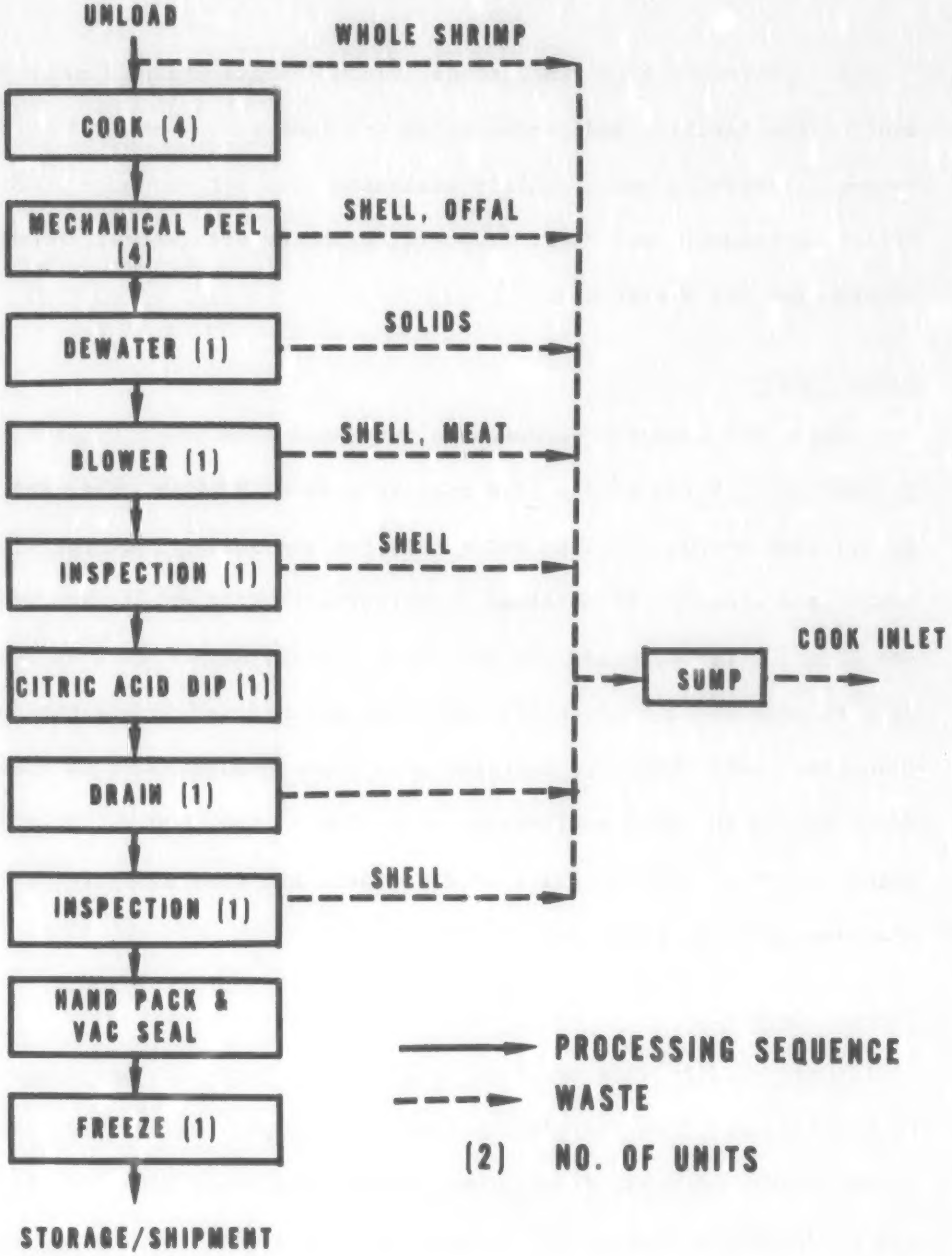
UNLOAD
WHOLE SHRIMP
COOK (4)
MECHANICAL PEEL (4)
SHELL, OFFAL
DEWATER (1)
SOLIDS
BLOWER (1)
SHELL, MEAT
INSPECTION (1)
SHELL
CITRIC ACID DIP (1)
SUMP
COOK INLET
DRAIN (1)
INSPECTION (1)
SHELL
HAND PACK & VAC SEAL
FREEZE (1)
STORAGE/SHIPMENT
PROCESSING SEQUENCE
WASTE
(2) NO. OF UNITS

Figure VI-C3. Alaska Seafoods, Inc.,Homer, Alaska Shrimp Processing Sequence

that detailed in Section V. After processing, the shrimp are placed in plate contact freezers which can process 545 kg (1,200 lb)/hr.

Crab--The final product of the crab processing operation is either whole crabs or crab meat [Figure VI-C4]. The general process is accomplished in a manner similar to that detailed in Section V. After cooking and spray cooling, some of the crab are selected for processing whole and the remainder are processed as packaged crab meat in 18 kg (40 lb) cartons. After processing, both types of crab product are shipped with the frozen shrimp.

Waste Sources

Domestic Wastes--All domestic wastes from the plant flow to a septic tank that is cleaned once every six months. The effluent from the septic tank discharges into Kachemak Bay without disinfection.

Refuse--Cartons, paper, and other combustible refuse material are burned in the company incinerator. Garbage and non-combustible materials are collected once a week and hauled to the city landfill.

Process Wastes--Shrimp wastes originate from the cookers, peelers, dewatering process, inspection and unloading areas in the plant. Wastewaters from the unloading area contain solids and whole shrimp (spilled). The cooking and peeling wastes include soluble organics, shells, solids, and offal. In the dewatering process, shrimp are air dried with a blower; shells and meat fragments are spilled into the waste stream. At the inspection areas, the wastes consist of shells and damaged meat.

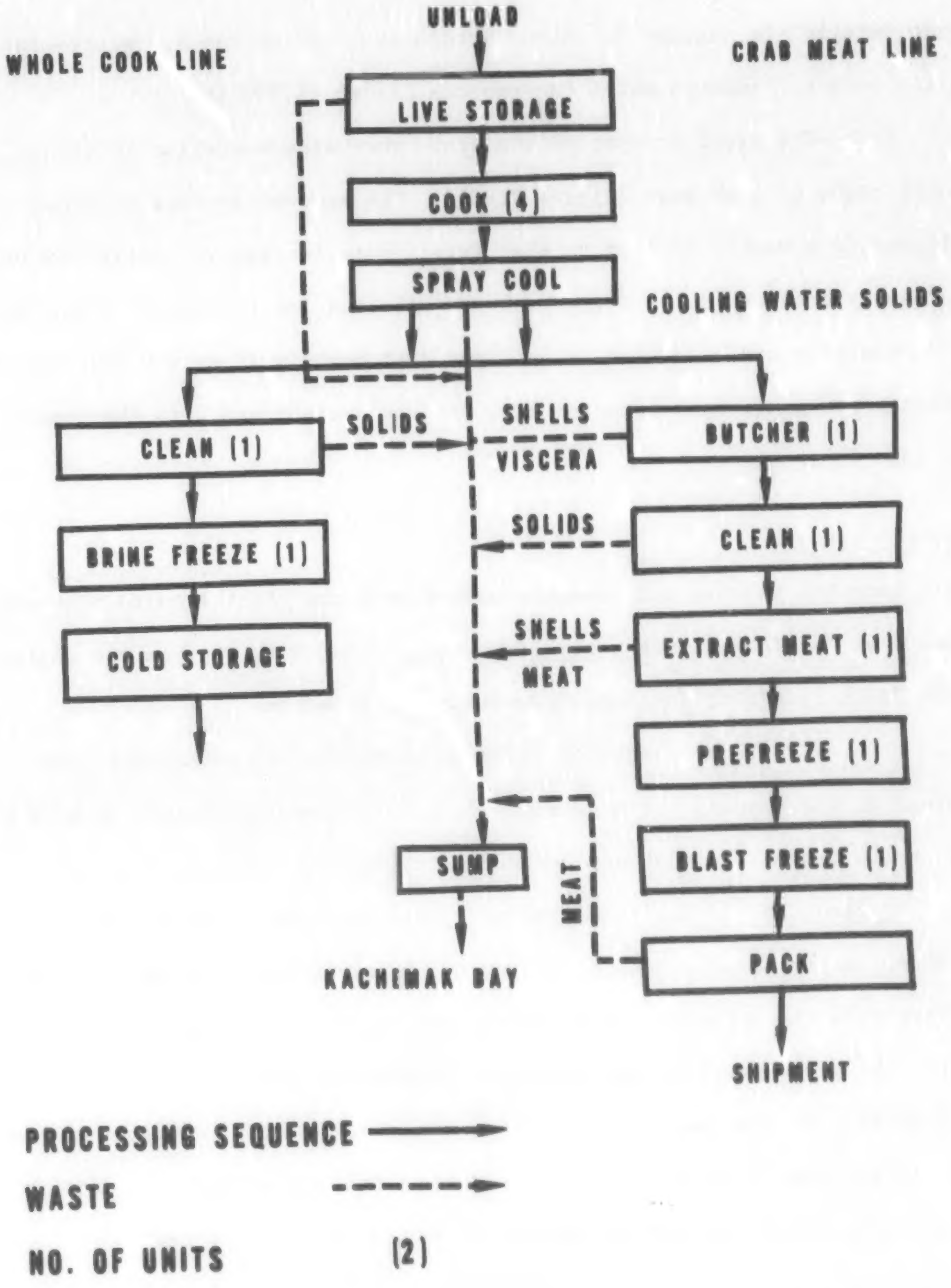
UNLOAD
WHOLE COOK LINE
CRAB MEAT LINE
LIVE STORAGE
COOK (4)
SPRAY COOL
COOLING WATER SOLIDS
CLEAN (1)
SOLIDS
SHELLS
VISCERA
BUTCHER (1)
BRINE FREEZE (1)
SOLIDS
CLEAN (1)
COLD STORAGE
SHELLS
MEAT
EXTRACT MEAT (1)
PREFREEZE (1)
SUMP
MEAT
BLAST FREEZE (1)
KACHEMAK BAY
PACK
SHIPMENT
PROCESSING SEQUENCE
WASTE
NO. OF UNITS
(2)

Figure VI-C4. Alaska Seafoods, Inc. Homer, Alaska

Crab Processing Sequence

The whole-cooked crab process produces small amounts of wastes consisting mainly of solids from the cleaning operation. In the crab-meat process, wastes occur from the butchering, cleaning, and meat extraction operations.

Additional wastewater is generated during the plant cleanup. Saltwater from the wells is used to wash equipment every two hours. During the final cleanup, a chemical solution, CHEM-PROCIDE,^{R*} is used to wash floors and walls.

All waste flows within the plant are collected in flumes, conveyed to a sump (3m x 3 m x 2 m deep), and pumped untreated 90 m (300 ft) into the bay at the 0.9 m (3 ft) minus tide contour. According to the RAPP application, the discharge is located at the 3 m (10 ft) minus tide contour. This discrepancy between discharge locations probably occurs because the company has removed sections from the end of the discharge pipe. The extreme end of the pipe was cut because it became clogged and the pump pressure could not break the obstruction. A second discharge line from the pit serves as an emergency bypass if the pump fails. The Parma Lifter pump, (12.6 l/sec or 200 gpm) chops all material in the wastewater prior to discharge, except for king and snow crabs wastes which are ground before entering the pit.

As reported in the RAPP application, the total amount of wastewater discharged to Homer Spit is about 590 m^3/day (0.156 mgd). The characteristics of this wastewater are listed in Table VI-C1.

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* Pace Chemical Corporation, Seattle, Washington.

TABLE VI-C1

WASTEWATER CHARACTERISTICS[a]
ALASKA SEAFOODS, INC., HOMER, ALASKA

Parameter	Average Concentration[b]	Average Load	
		kg/day	lb/day
pH, su	6.8		
Temperature (summer)°C (°F)	7(45)		
Temperature (winter)°C (°F)	3(37)		
BOD_5	313	186	409
COD	1,840	1,090	2,401
Total Solids	27,079	16,030	35,338
SS	2,435	1,441	3,177
NH_3 as N	14	8	18
TKN as N	1,680	995	2,192
NO_2 as N	140	83	183
NO_3 as N	c/		
Total Phosphorus as P	38.5	23	50
Oil/Grease	180	107	235

---

a/ Data as reported in the company RAPP application.
b/ Values reported as mg/l, except pH and temperature.
c/ Not determined due to interference in sea water.

Plant officials estimate about 15 percent of the original raw shrimp weight and 25 percent of the crab meat is recovered as an edible product. Hence, based on the estimated production figures for 1973, the resulting waste load discharged to the Bay would be about 1,450 kkg (3.2 million lb) of crab and 1,950 kkg (4.3 million lb) of shrimp.

Treatment Needs

Company management anticipates the installation of shaker screens to recover shells from shrimp and crab processing operations. About 55 percent of the recovered material will eventually be used for fertilizer and fish food. Presently no plant on the Kenai Peninsula can utilize this material.

There was no evidence of waste deposits on the beaches of Homer Spit. At the water's edge, small amounts of pulverized shrimp shells were evident. At low tide some floating solids wash toward the shore from the discharge pipe. Tidal currents cleanse the area and solids do not accumulate. However, the effluent pipe should be extended below mean low tide to prevent the solids from floating back to the beach.

Domestic wastes should be discharged to the municipal sewer system when this service becomes available on the Spit. In the interim, the effluent from the septic tank should receive adequate disinfection.

C-2 COLUMBIA WARDS FISHERIES, KENAI, ALASKA

General

Columbia Wards Fisheries owns and operates a salmon canning and freezing plant at Kenai, Alaska. The plant is on the south bank, near the mouth of the Kenai River [Figure VI-2 and VI-C5]. The cannery, constructed in 1922 and operated by Libby-McNeil-Libby, was purchased by Columbia Wards Fisheries in 1959. The layout of the plant area is shown in Figure VI-C6. A Refuse Act Permit Program (RAPP) application was filed on 30 December 1971 with the U.S. Army Corps of Engineers.

Plant management and maintenance personnel arrived from Seattle, Wash. in mid-May to prepare the cannery for operation. The processing period begins in late June and continues through mid-August with about 35 days of actual plant operation during this period. During the normal processing day, the average working shift is 8 hr: the longest shift during the 1973 season was 14 hr. The cannery employs about 110 people. excluding fishermen.

The plant freezes about 14 percent of the total salmon processed: the rest are canned. Of the salmon processed, about 40 percent are sockeye, 40 percent are chum and the remaining 20 percent consist of silver, pink, and chinook. The estimated salmon production for 1973 was 30,000 cases.* The 1971 and 1972 production was 16,000 and 37,700 cases, respectively: the largest annual production was 93,000 cases.

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* One case of salmon weighs 21.8 kg consisting of 48 one-pound cans.

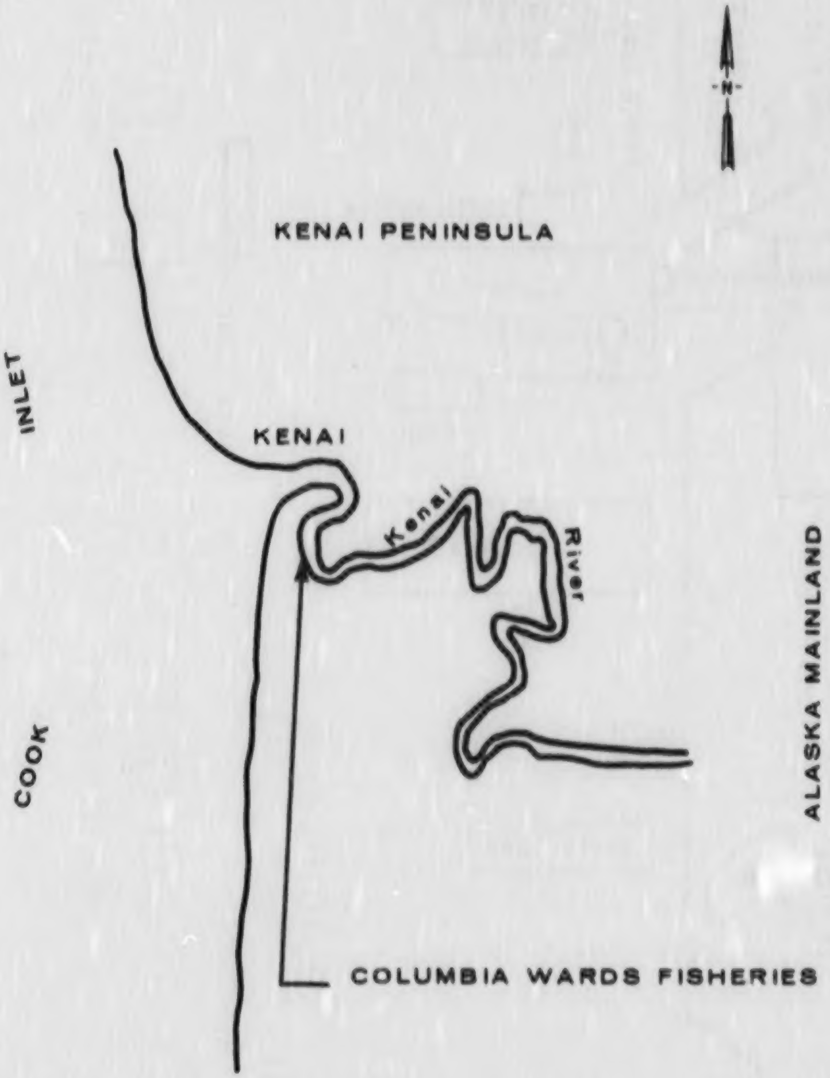
N
KENAI PENINSULA
INLET
COOK
KENAI
Kenai
River
ALASKA MAINLAND
COLUMBIA WARDS FISHERIES

Figure VI–C5. Columbia Wards Fisheries, Kenai, Alaska Location Map

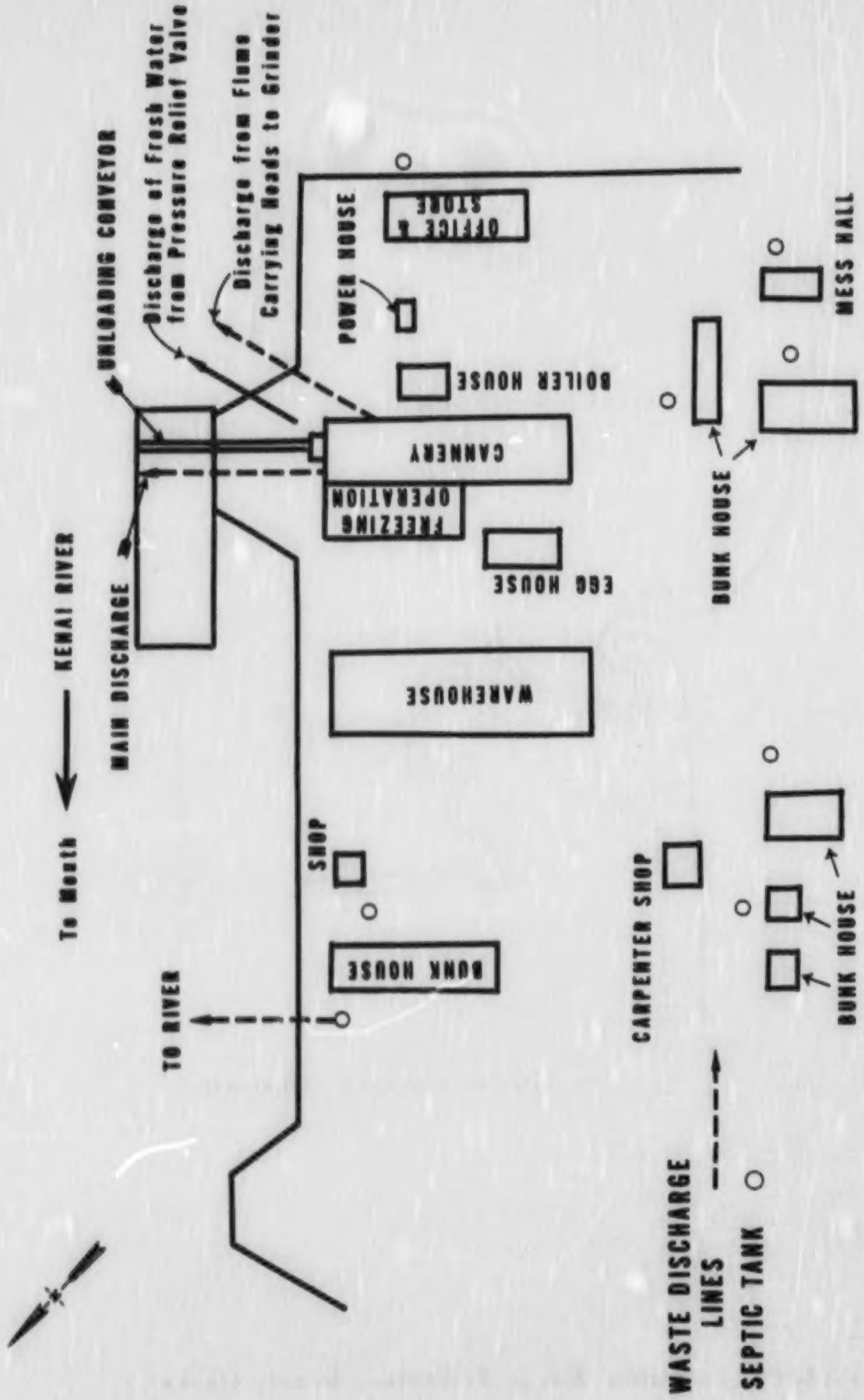
UNLOADING CONVEYOR
Discharge of Fresh Water from Pressure Relief Valve
Discharge from Flume Carrying Heads to Grinder
POWER HOUSE
OFFICE & STORE
MESS HALL
BOILER HOUSE
CANNERY
FREEZING OPERATION
EGG HOUSE
BUNK HOUSE
KENAI RIVER
MAIN DISCHARGE
WAREHOUSE
To Mouth
SHOP
CARPENTER SHOP
BUNK HOUSE
BUNK HOUSE
TO RIVER
WASTE DISCHARGE LINES
SEPTIC TANK

Figure VI–C6. Columbia Wards Fisheries, Kenai, Alaska Plant Layout

EPA personnel from the National Field Investigations Center-Denver conducted an engineering survey of the facility on 26 July 1973. A receiving water quality evaluation was not conducted. Harold Brindle, plant superintendent, provided information and assistance.

Water Supply

All water used at the plant is obtained from three freshwater wells, of which two are about 18 m (60 ft) deep and the third is 55 m (180 ft) deep. According to the RAPP application the quantity of water used is 606 m^3/day (0.16 mgd), which includes 38 m^3/day (0.01 mgd) obtained from surface sources. Water use was determined by personnel from Bumble Bee Seafoods in 1971. Chlorine gas is used to disinfect the water: the chlorine residual ranges between 0.1 and 0.2 mg/l. Since the water is used for domestic purposes, samples are routinely sent to the Alaska Department of Health and Welfare in Anchorage for bacteriological analysis.

Process Operations

About 90 percent of the salmon processed by the plants are caught by ocean-going boats; the remaining 10 percent are caught by shore nets in the Kenai River. After the fish are unloaded from tenders, scows, or trucks, they are conveyed by water flume to any of 10 fiberglass holding bins, iced, and stored until time for processing. Salmon are processed by either freezing or canning operations [Figure VI-C7].

Salmon selected for freezing are separated from those to be canned, and transported to the freezing area. Eggs are recovered by hand before the viscera is removed. Heads, fins, and tails are not removed. The

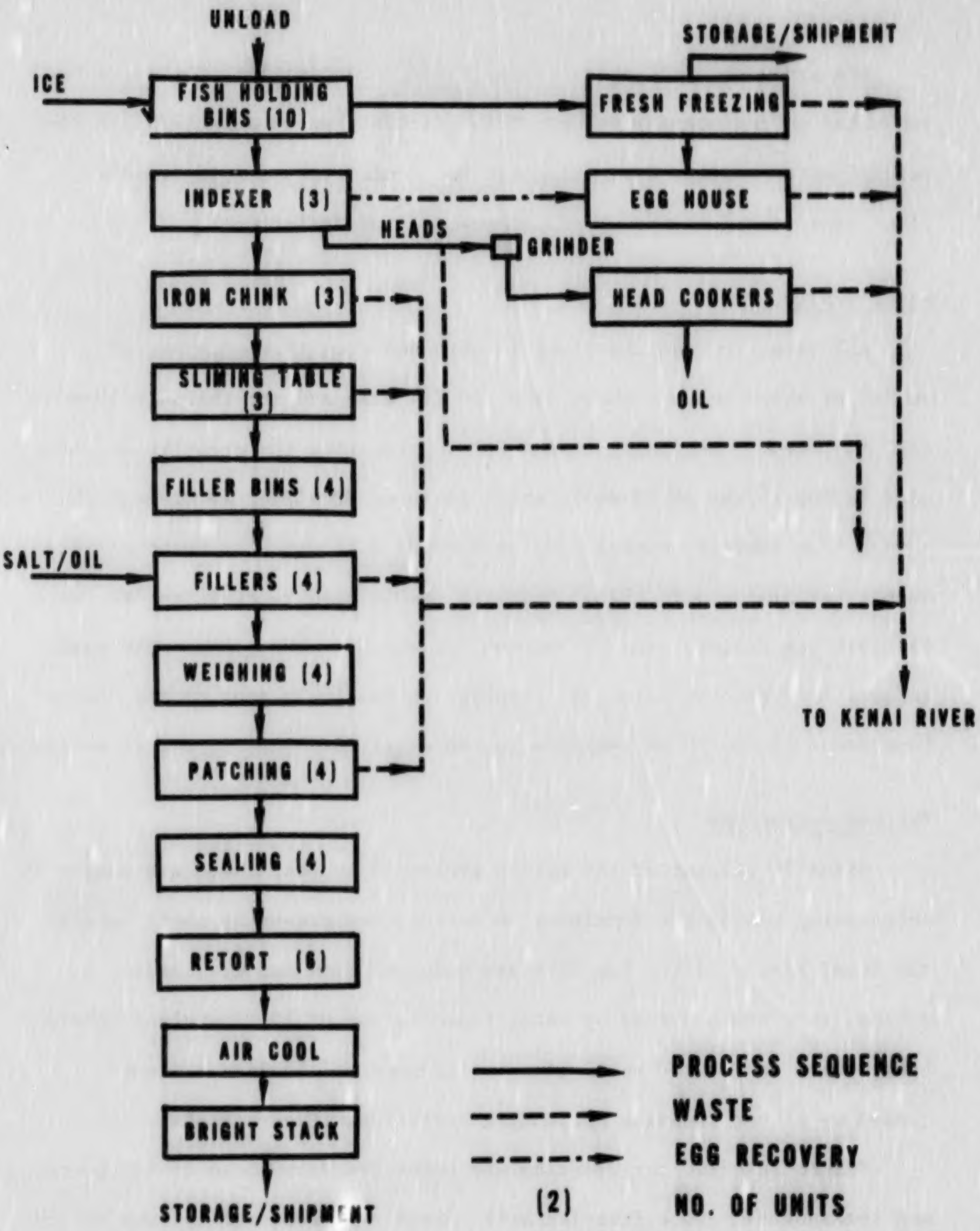
UNLOAD
ICE
FISH HOLDING BINS (10)
STORAGE/SHIPMENT
FRESH FREEZING
INDEXER (3)
EGG HOUSE
HEADS
GRINDER
IRON CHINK (3)
HEAD COOKERS
SLIMING TABLE (3)
OIL
FILLER BINS (4)
SALT/OIL
FILLERS (4)
WEIGHING (4)
TO KENAI RIVER
PATCHING (4)
SEALING (4)
RETORT (6)
AIR COOL
BRIGHT STACK
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(2)
NO. OF UNITS

Figure VI-C7. Columbia Wards Fisheries Kenai, Alaska Salmon Processing Sequence

processed salmon are then placed in one of two Freze Cel plate freezers before shipment. The canning process is conducted in a manner similar to that described in Section V. Fish heads, except for pink salmon, are processed for recovery of oil. Eggs are recovered, cured in brine agitators, hand-crated, and shipped to Japan.

The cannery uses two 1-lb, one 1/2-lb, and one 1/4-lb can lines for processing salmon.

Waste Sources

Domestic Wastes--Domestic wastes are treated by septic tanks. Seven septic tanks discharge to drainage fields, whereas the tank that services the cannery area discharges directly to the river. Disinfection of septic tank effluents is not practiced; however, chlorine is introduced into the toilets during cleaning. The quantity of wastewater discharged, as reported in the RAPP application, is 45 m^3/day (12,000 gpd).

Refuse--The superintendent could not estimate the amount of refuse wastes generated. He stated that this material was hauled daily to a landfill on the company property. Although the area is described as a landfill, the wastes are not covered each day.

Process Wastes--Process wastes originate from the unloading dock, fish house, and cannery. The floors in the fish house are concrete which facilitates collection of waters from salmon processing and cleaning operations. The cannery floor is constructed of wood, but flumes deliver the wastes to the central discharge pipe. Most of the process waste is created during butchering. Viscera, tails and fins are flumed to a central trough that continuously discharges the waste inside the dock face through the main 2.5 cm (10 in.) diameter outfall pipe. The point of discharge is in the tidal stream above high tide. The byproduct from the oil recovery process, a red liquor, is discharged from the cookers to the Kenai River.

The characteristics of the process wastes were determined by Bumble Bee Seafoods in 1971 and reported in the RAPP application [Table VI-C2]. The river water used to flume the fish from the scows to holding bins was also characterized and reported in the application [Table VI-C3].

Plant management estimates that from 33 to 34 kg (72 to 75 lb) of fish are required to produce one case (21.8 kg or 48 lb) of canned salmon. Of the 11 kg (25 lb) of waste material generated, about 1.1 kg (2.5 lb) of eggs are recovered, and 3.4 kg (7.5 lb) are recovered as heads, leaving about 6.8 kg (15 lb) of waste discharged per case of canned salmon. The estimated wasteload that will be discharged from the plant during 1973 is 204 kkg (450,000 lb) or 5.8 kkg (12,850 lb) per day of actual processing.

Treatment Needs

Process wastes are discharged under the dock directly into the Kenai River. Observation of the river at low tide revealed that wastes were dispersed with no visual evidence of solids within 25 m of the outfall. Beaches were clean and no deposits of solids were evident. Since water quality studies were not conducted, the fate of the solid matter in the

TABLE VI-C2

WASTEWATER CHARACTERISTICS[a/]
COLUMBIA WARDS FISHERIES, KENAI, ALASKA

Parameter	Average Concentration[b/]	Average Load	
		kg/day	lb/day
Flow, m^3/day (mgd)	492 (0.13)		
pH, su	7.4		
Temperature, °C (°F)	8 (46)		
BOD_5	2,080	1,025	2,260
COD	3,240	1,590	3,510
Total Solids	9,450	4,670	10,300
SS	5,900	2,910	6,410
NH_3 as N	37.9	18.6	41.1
TKN as N	833	410	904
NO_2 as N	0.31	0.15	0.33
NO_3 as N	1.31	0.64	1.42
Total Phosphorus as P	220	108	239
Oil/Grease	2,530	1,240	2,740

---

a/ Data as reported in the company RAPP application.
b/ Value reported as mg/l, except flow, pH and temperature.

TABLE VI-C3

FLUME WASTEWATER CHARACTERISTICS[a]
COLUMBIA WARDS FISHERIES, KENAI, ALASKA

Parameter	Average Concentration[b]	Average Load kg/day	Average Load lb/day
Flow, m^3/day (gpd)	45 (12,000)		
pH, su	7.5		
Temperature, °C (°F)	11 (51)		
BOD_5	16	0.71	1.6
COD	601	27	60
Total Solids	30,900	1,406	3,100
SS	52	2.4	5.2
NH_3 as N	0.37	0.017	0.037
TKN as N	2	0.09	0.2
NO_2 as N	0.006	0.00031	0.0006
NO_3 as N	0.18	0.008	0.018
Total Phosphorus as P	6.0	0.27	0.6
Oil/Grease	710	32	71

---

[a] Data as reported in the company RAPP application.

[b] Values reported as mg/l except flow, pH, and temperature.

discharge was not determined. Some of the waste matter is eaten by seagulls. However, most of the material either settles to the bottom of the river or is carried out to sea. During peak processing periods and daily cannery operations, water quality problems may occur. Tidal currents may not be sufficient to adequately disperse the waste load and localized areas of solids buildup may develop on the beaches and river bed.

To ensure adequate disposal of process wastes during peak operating periods, two options are available. The process wastes could either be screened, using a 1 mm (0.040 in.) grid spacing, and the solids that are retained hauled to the landfill and covered daily: or, the solids could be ground and discharged into the river below the low mean tide level at a point where adequate dispersal will occur. Under the first option, the waste flow passing the screen should also be discharged below the low low tide level.

Due to the short processing season (about 4 months) and the fact that the cannery is located across the river from the city of Kenai and sewer service is not available, the septic tank system presently used to treat domestic wastewaters should be adequate. However, the effluent from the septic tank which discharges directly to the Kenai River should receive adequate disinfection.

C-3 KENAI SALMON PACKING COMPANY, KENAI, ALASKA

General

The Kenai Salmon Packing Company of Seattle, Wash. has owned and operated a cannery in Kenai, Alaska since 1949 [Figures VI-2 and VI-C8]. The cannery, built in 1926 as a saltry, was converted to a canning facility in 1946. The layout of the plant is shown in Figure VI-C9. A Refuse Act Permit Program (RAPP) application was filed with the U.S. Army Corps of Engineers in June 1971.

The company processes about 30 days a year from 5 June to 10 August. About ten percent of the salmon produced are fresh frozen: the rest are canned. The fresh-frozen salmon are sent to Japan, except for chinook which are sent to Seattle. Canned salmon are distributed as Company brands--Royal Red and Royal Pink. During peak processing periods, the company employs 100 people. During the normal processing day the average working shift varies between 8 and 14 hr. There are times, however, when the shift is less than 8 hr/day.

About 60 percent of the processed salmon are supplied by fishing boats: the remaining portion is taken from shore nets. Of the salmon processed, about 67 percent are sockeyes, and the remaining 33 percent are distributed equally among chinooks, chums, pinks, and cohos. Plant production capacity is 75,000 fish/day or 204 kkg (450,000 lb)/day. The anticipated production for 1973 was 40,000 cases; the 1972 production was 48,000 cases.

EPA personnel from the National Field Investigations Center-Denver

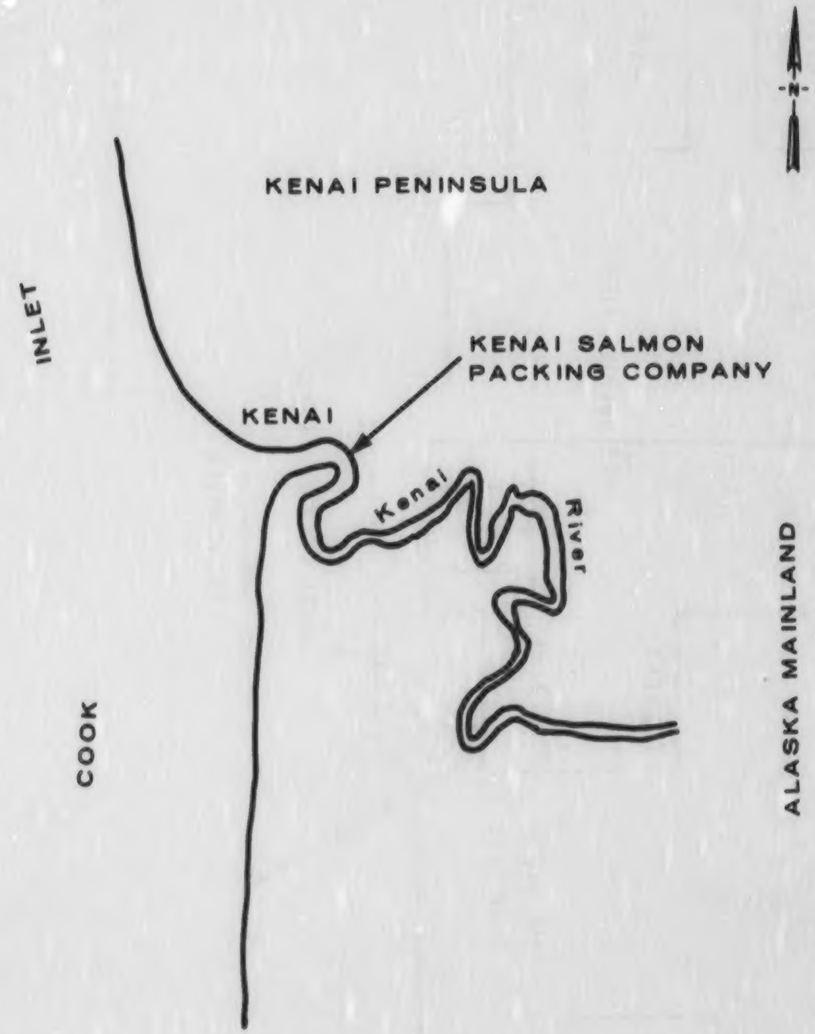
KENAI PENINSULA
INLET
COOK
KENAI
KENAI SALMON PACKING COMPANY
Kenai
River
ALASKA MAINLAND
N

Figure VI–C8. Kenai Salmon Packing Company, Kenai, Alaska Location Map

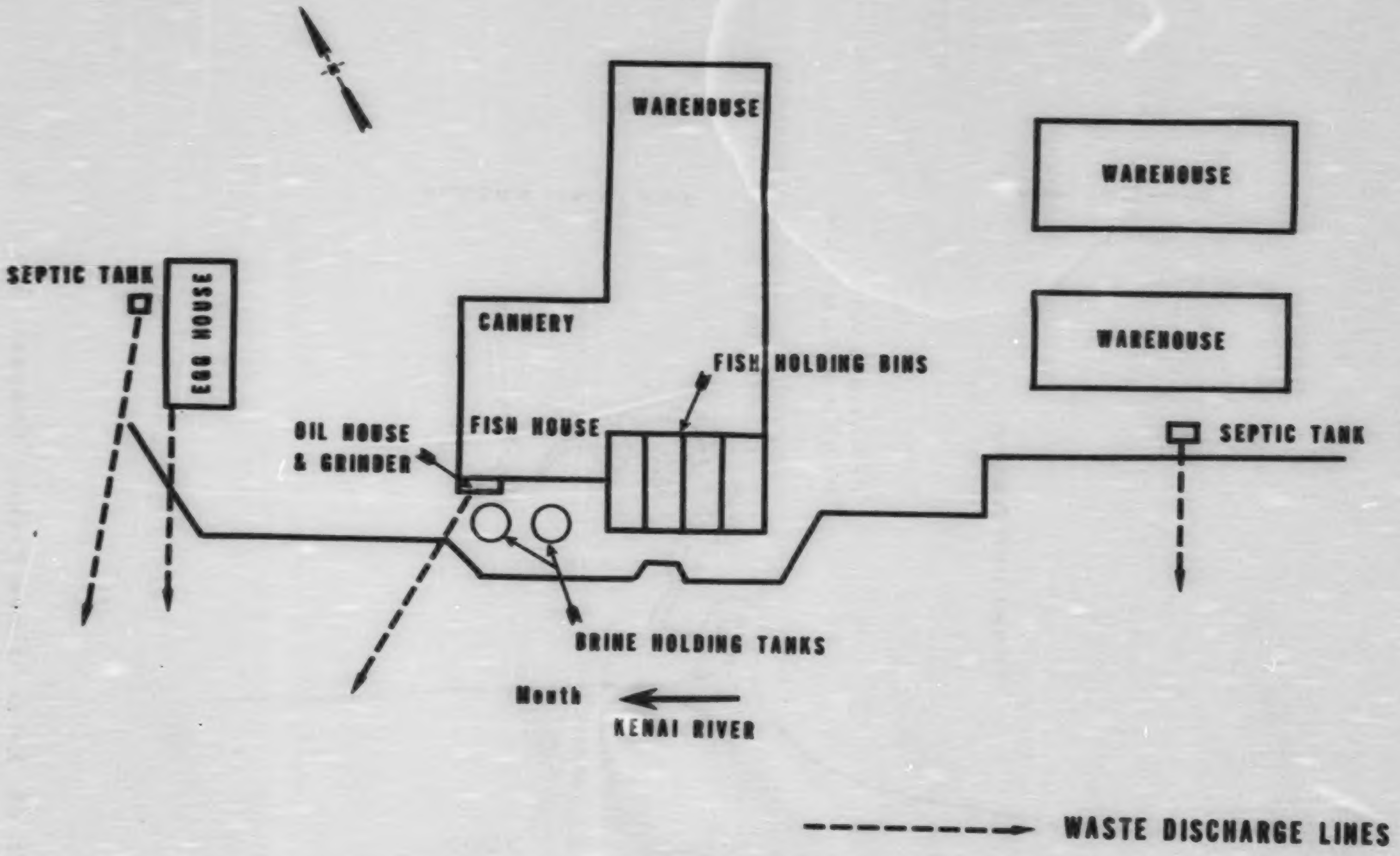
WAREHOUSE
WAREHOUSE
WAREHOUSE
SEPTIC TANK
EGG HOUSE
CANNERY
FISH HOLDING BINS
OIL HOUSE & GRINDER
FISH HOUSE
SEPTIC TANK
BRINE HOLDING TANKS
Mouth
KENAI RIVER
WASTE DISCHARGE LINES

Figure VI–C9. Kenai Salmon Packing Co., Kenai, Alaska
Plant Layout

conducted a survey of the facility on 25 July 1973. A receiving water quality evaluation was not conducted. The owner, Harold Daubenspeck, and plant superintendent, Fred McGill, provided information and assistance.

Water Supply

Processing and domestic water used at the plant is obtained from seven wells that range in depth from 24 m (80 ft) to 30 m (100 ft). As reported in the RAPP application the plant water use is 545 m^3/day (0.144 mgd). The water use was later changed in the application to 1,360 m^3/day (0.36 mgd). According to Mr. Daubenspeck, the average plant consumption is 795 m^3/day (0.21 mgd). The plant can pump about 7,570 m^3/day (2 mgd). Water uses within the plant, based on the RAPP data, are 5 percent for cooling, 7 percent for boiler water, 85 percent for processing, and 3 percent for sanitary purposes. Except for the addition of 1 mg/l chlorine to the water used to cool the cans after retort, the water supply is not disinfected. Samples are routinely sent to Alaska Department of Health and Welfare in Anchorage for bacteriological analysis.

Process Operations

Salmon are unloaded from brine tenders, scows or trucks and conveyed to one of four Gunite holding bins, or two round wooden tanks (total capacity 250,000 to 300,000 fish). Fish are stored in a brine solution at -1.7°C (29°F) until processed. Salmon are processed by either fresh freezing or canning [Figure VI-C10].

Processing in the fresh-freezing area includes egg recovery and hand butchering to remove heads, tails, fins, and viscera. The salmon

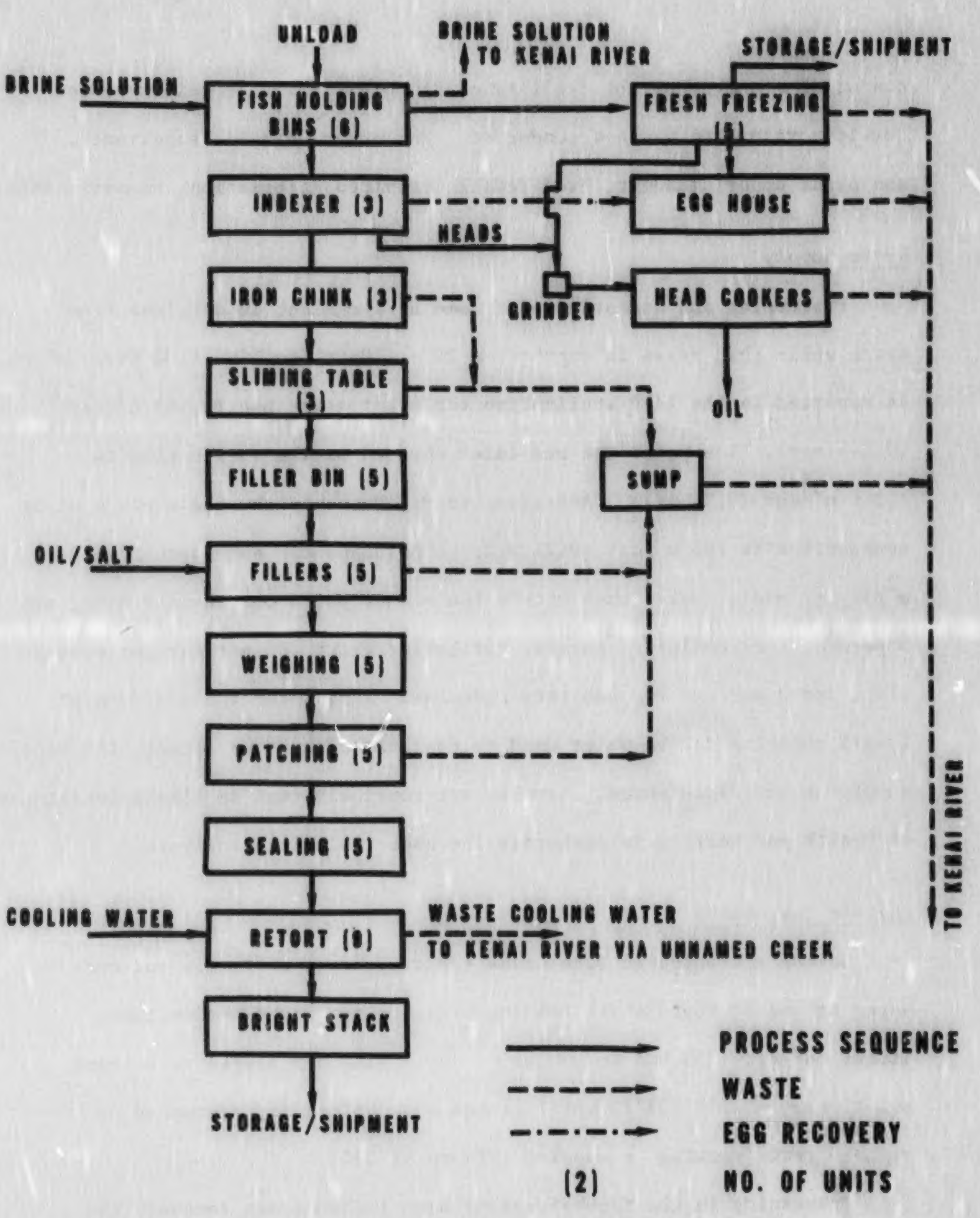
UNLOAD
BRINE SOLUTION TO KENAI RIVER
STORAGE/SHIPMENT
BRINE SOLUTION
FISH HOLDING BINS (6)
FRESH FREEZING (5)
INDEXER (3)
EGG HOUSE
HEADS
IRON CHINK (3)
GRINDER
HEAD COOKERS
SLIMING TABLE (3)
OIL
FILLER BIN (5)
SUMP
OIL/SALT
FILLERS (5)
WEIGHING (5)
PATCHING (5)
TO KENAI RIVER
SEALING (5)
COOLING WATER
RETORT (9)
WASTE COOLING WATER TO KENAI RIVER VIA UNNAMED CREEK
BRIGHT STACK
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(2)
NO. OF UNITS

Figure VI-C10. Kenai Salmon Packing Company, Kenai, Alaska Salmon Processing Sequence

are then frozen in 5 Freze Cel plate freezers. Except for chinook, which are shipped loose, all frozen salmon are packed in cartons for shipment to Seattle or Japan.

The canning operation uses two 1/4-lb, two 1/2-lb, and one 1-lb can lines for processing salmon. The cannery processing operation is conducted in a manner similar to that described in Section V. Only sockeye salmon heads are recovered and cooked for oil; the remainder are discharged to the Kenai River. Eggs are recovered by hand, conveyed to the egg house, cured in brine agitators, hand packed in boxes (10 kg or 22 lb per box), and shipped to Japan.

Waste Sources

Domestic Wastes--Domestic wastes are treated by two septic tanks that discharge directly to the Kenai River. The smaller septic tank receives domestic wastes from the egg house; all other wastes flow to the second septic tank located upstream of the cannery [Figure VI-C9]. Based on the water use figures estimated by plant officials, the domestic wastewater flow is about 24 m^3/day (6,300 gpd). The RAPP application reported this flow as 16 m^3/day (4,320 gpd). The septic tank effluents are not disinfected.

Refuse--Although the quantity of refuse was not known, plant officials state that during peak processing periods two truck loads are hauled to the city landfill each day. Under normal operating conditions, one truck load is hauled each day. Since the waste is not compacted and the truck is an open-bed G.I. vehicle, the amount of refuse cannot be estimated.

Process Wastes--A small portion of the process wastes are generated at the unloading dock and include blood and slime in varying amounts. The floors in the fish house and cannery are concrete and allow all wastes from salmon processing and cleanup operations to be collected in flumes which flow to a pit (about 1.2 m cu). The major portion of the process wastes originates from the butchering operation in the fish house. Viscera, tails, fins, and about one-third of the heads are flumed to the pit. The unground wastes flow by gravity from the pit through a 20 cm (8 in.) diameter outfall pipe. The pipe extends between 24 and 36 m (80 and 120 ft) from the dock face into the Kenai River to a point below the minimum low water level. The waste discharge is continuous throughout the processing day.

Wastes that originate from the egg house (eggs, washwater, and brine solution from the agitators) are discharged without grinding to the river through another outfall pipe.

Waste loads and concentration reported in the RAPP application for the canning and freezing processes are listed in Tables VI-C4 and VI-C5, respectively. Plant management estimated that it requires about 34 kg (75 lb) of fish to produce one case (21.8 kg or 48 lb) of canned salmon. Of the 12 kg (27 lb) of waste material generated per case, about 1.3 kg (2.5 lb) are recovered as eggs and 3.4 kg (7.5 lb) as heads, leaving about 7.7 kg (17 lb) of waste material discharged per case of canned salmon. Based on the 1973 estimated production of 40,000 cases,

TABLE VI-C4

SALMON CANNING WASTEWATER CHARACTERISTICS[a]
KENAI SALMON PACKING COMPANY, KENAI, ALASKA

Parameter	Average Concentration[b]	Average Load		Average Load[c]	
		kg/day	lb/day	kg/case	lb/case
Flow, m^3/day (mgd)	1136 (0.30)				
pH, su	7.0				
Temperature, °C (°F)	8 (46)				
BOD_5	92,500	105,000	231,400	17.5	38.5
COD	138,000	156,500	345,000	26.1	57.5
Total Solids	257,700	292,600	645,000	48.8	107.5
SS	44,200	50,350	111,000	8.4	18.5
NH_3 as N	170	193	425	0.03	0.07
TKN as N	1,447	1,640	3,620	0.27	0.60
NO_2 as N	3.2	3.63	8.01	0.0004	0.001
NO_3 as N	0.5	0.57	1.25	0.00009	0.0002
Total Phosphorus as P	420	476	1,051	0.079	0.175
Oil/Grease	29,000	32,900	72,558		

---

[a] Data as reported in the company RAPP application.

[b] All values reported as mg/l except flow, pH, and temperature.

[c] Based on daily production of 6,000 cases. Values not reported in RAPP application.

TABLE VI-C5

SALMON FREEZING WASTEWATER CHARACTERISTICS[a]
KENAI SALMON PACKING COMPANY, KENAI, ALASKA

Parameter	Average Concentration[b]	Average Load kg/day	Average Load lb/day	Average Load (frozen)[c] kg/kg
Flow, m^3day (gpd)	227 (60,000)			
pH, su	7.0			
Temperature, °C (°F)	8 (46)			
BOD_5	6,950	1,577	3,477	0.06
COD	9,600	2,179	4,803	0.08
Total Solids	10,000	2,270	5,004	0.08
SS	2,800	635	1,401	0.02
NH_3 as N	127	29	63	0.001
TKN as N	949	215	475	0.008
NO_2 as N	0.5	0.11	0.25	
NO_3 as N	8.45	1.92	4.23	
Total Phosphorus as P	134	30	67	0.001
Oil/Grease	775	153	338	0.006

---

[a] Data as reported in the company RAPP application.

[b] Values reported as mg/l except flow, pH, and temperature.

[c] Based on daily production of 27.2 kkg (60,000 lb)/day. Values not reported in RAPP application.

the waste load that will be discharged to the Kenai River during the year is 308 kkg (680,000 lb) of organic solids and solubles. According to the RAPP application, about 272 kkg (600,000 lb) of waste is discharged over the processing period, based on a daily salmon production of 6,000 cases.

Treatment Needs

Observation of the Kenai River at low tide during periods of salmon processing showed that the wastes were being effectively dispersed as there was no evidence of solids in the river or on the beaches. Since receiving water quality studies were not conducted, the effect of the wastes on the environment was not determined. The RAPP application states that process wastes are "deposited into the bottom of the river over a period of 90 to 100 days. With the flow of the river at millions of gallons per minute the discharge would be insignificant." Since process wastes are not ground, the solid material settles on the bottom of the river. During peak processing periods when the cannery is operating daily, water quality problems could occur. The tidal currents may not be sufficient to disperse the waste and solids may be deposited in localized areas on the river bottom and on the beaches.

To ensure adequate disposal, process wastewater should either be screened, using a 1 mm (0.040 in.) grid spacing, and the solids that are retained hauled to the landfill and covered immediately; or the solids should be ground before discharge to the river. The latter option appears to be the more feasible at this time.

Due to the short processing period (4 months) and the fact that municipal sewer service is not available, the present septic tank system for domestic wastewater should be adequate. The effluent from the septic tanks should receive adequate disinfection to prevent pathogenic bacteria and viruses from reaching the fish unloading area. If municipal sewer service becomes available, the plant should connect its domestic wastewater flow to the city sewer.

C-4 WHITNEY-FIDALGO SEAFOODS, INC., ANCHORAGE, ALASKA

General

Whitney-Fidalgo Seafoods operates two salmon processing facilities in Anchorage, Alaska [Figure VI-2]. The canning plant is located on Ship Creek [Figure VI-C11] near the downtown metropolitan area and the fresh-frozen facility is adjacent to the Anchorage International Airport. The cannery, built in 1933, was purchased by Whitney-Fidalgo in 1967. The freezing operation, originally a U. S. Government facility built in 1966, was purchased in 1970. The layout of Whitney-Fidalgo Seafoods is shown in Figure VI-C12.

The cannery operates from June through August and processes on an average of 5 days/week for 10 to 12 hr/day. There are 95 people employed at the plant. Fish are obtained from the upper and lower areas of Cook Inlet and from Prince William Sound. They are also hauled by truck from Valdez, Homer, Kenai, and Seward. Of the salmon processed about 33 percent are sockeye, 10 percent chinook, 33 percent chum, and 23 percent pink. In addition, herring are processed for the eggs during April. The estimated total production for 1973 was 35,000 cases (762 kkg or 1.68 million lb). In 1971 and 1972, the annual production was 50,000 and 27,000 cases, respectively.

The freezing facility operates 8 hr every day from mid-April through September. The facility employs about 30 people. Fish are hauled to the freezing facility by truck from Valdez, Homer, Kenai, Seward, and the Whitney-Fidalgo cannery. The estimated 1973 production is 907 kkg

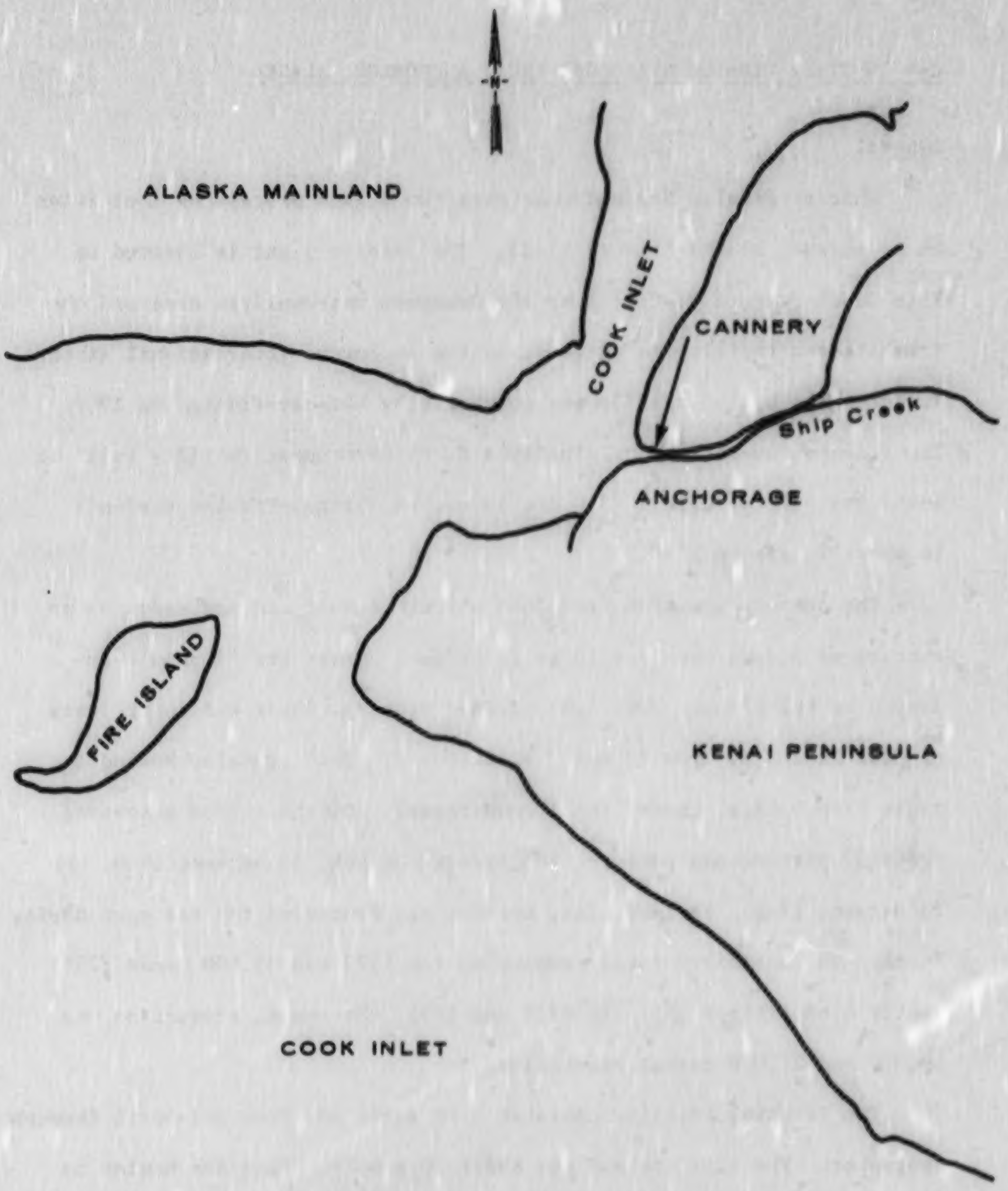
N
ALASKA MAINLAND
COOK INLET
CANNERY
Ship Creek
ANCHORAGE
FIRE ISLAND
KENAI PENINSULA
COOK INLET

Figure VI–C11. Whitney-Fidalco Seafoods Inc., Anchorage, Alaska
Location Map

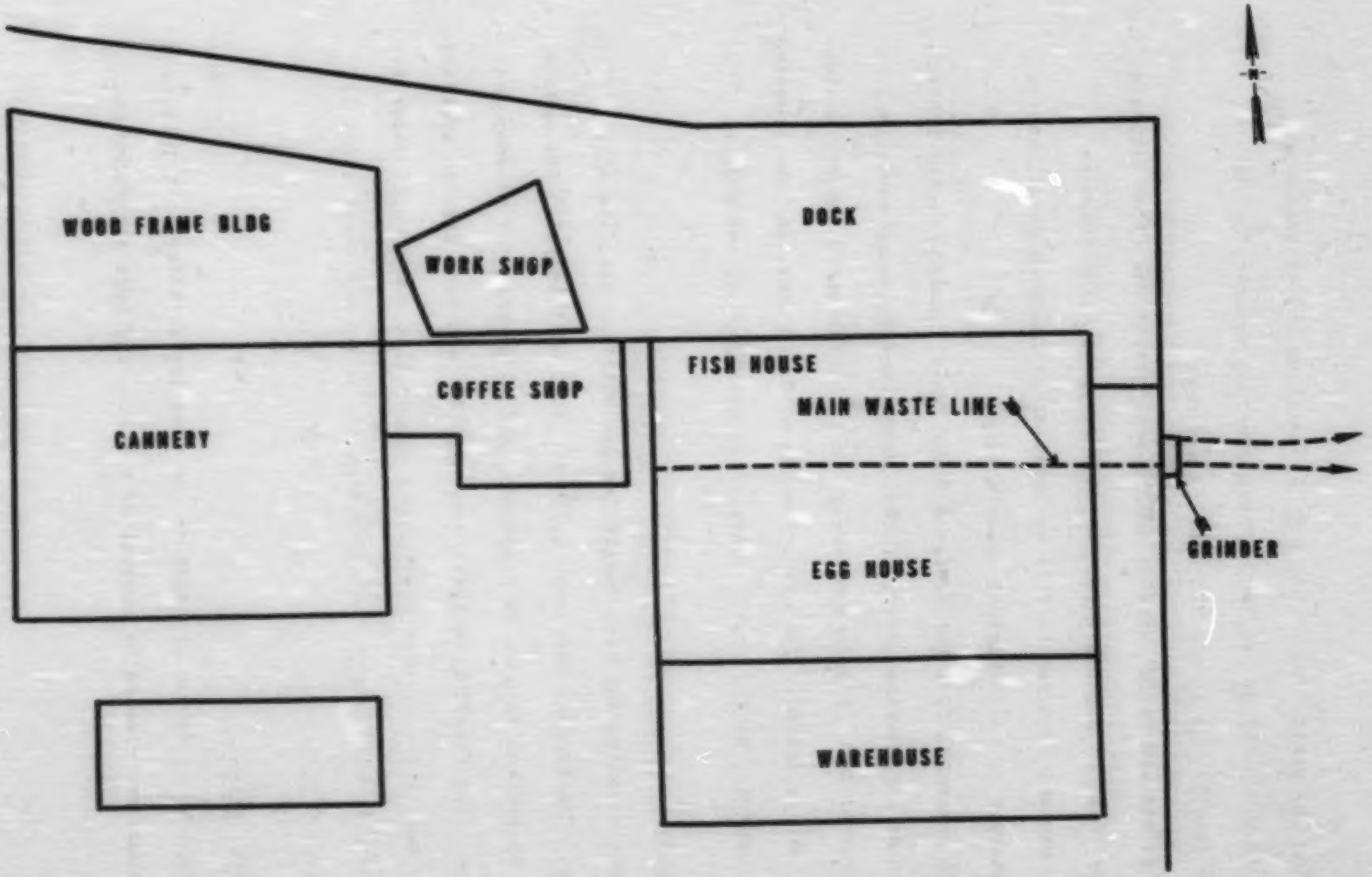
N
WOOD FRAME BLDG
WORK SHOP
DOCK
CANNERY
COFFEE SHOP
FISH HOUSE
MAIN WASTE LINE
GRINDER
EGG HOUSE
WAREHOUSE

Figure VI–C12. Whitney - Fidalgo Seafoods Inc., Anchorage, Alaska
Plant Layout

(2 million lb) consisting of 680 kkg (1.5 million lb) of salmon and 227 kkg (500,000 lb) of halibut. The production capacity of the freezing facility is 18 kkg (40,000 lb) per day.

A Refuse Act Permit Program (RAPP) application was filed with the U.S. Army Corps of Engineers for the canning plant. The freezing facility was not required to file an application inasmuch as all wastes are discharged to the municipal sewer system.

EPA personnel from the National Field Investigations Center-Denver conducted an engineering survey of the cannery and freezing operations on 24 July and 27 July 1973, respectively. A receiving water quality evaluation was not conducted. The cannery manager, Dan Bonney, and the freezing facility manager, Robert Scott, provided information and assistance.

Water Supply

Water supplies for both facilities are obtained from the city of Anchorage. The cannery purchases 4,730 m^3 (1.25 million gal.) per season, of which 65 percent is used in processing and 35 percent for cleanup and sanitation. The freezing facility personnel did not have figures available for water quantities or uses; Mr. Scott stated that very little water is used. The city water meter indicated that the plant was using about 55 m^3/day (14,400 gpd).

Process Operations

Salmon to be frozen are sent to the freezing facility. At this facility salmon are cleaned by removal of viscera, and eggs are recovered and then processed at the cannery. Heads are removed from 25 percent of the fish. The plant has three freezers that can hold 18.1 kkg (40,000 lb) at one time, with a total cold storage capacity of 680 kkg (1.5 million lb). Frozen fish are shipped to Seattle via Alaska Railroad Hydrotrain from Whittier, Alaska.

In the canning operation, salmon are received at the unloading dock, or by truck, and mechanically conveyed to eight metal holding tanks where they are either iced or stored in a brine solution at -1.7°C (29°F) [Figure VI-C13]. The cannery uses one 1/2-lb and one 1-lb can lines for processing salmon. The salmon canning sequence generally follows that described in Section V. No salmon heads are processed for oil; rather, they are either ground and discharged, or frozen and sold as crab bait.

Chum eggs are rubbed in brine, placed in plastic 19 liter (5 gal.) containers (21.8 kg of eggs/container), and shipped to the United States. Eggs from other salmon species are either cured in a brine solution and packaged for shipment to Japan, or sold for bait (Atlas Bait Company-Seattle, Wash.).

Waste Sources

Domestic Wastes--Both the canning and freezing facilities discharge all domestic wastes to the municipal sewer system.

Refuse--About one ton of refuse is hauled each day by the freezing facility to the Greater Anchorage Borough sanitary landfill. The cannery also hauls all of its refuse (quantity unknown) to the Borough sanitary landfill.

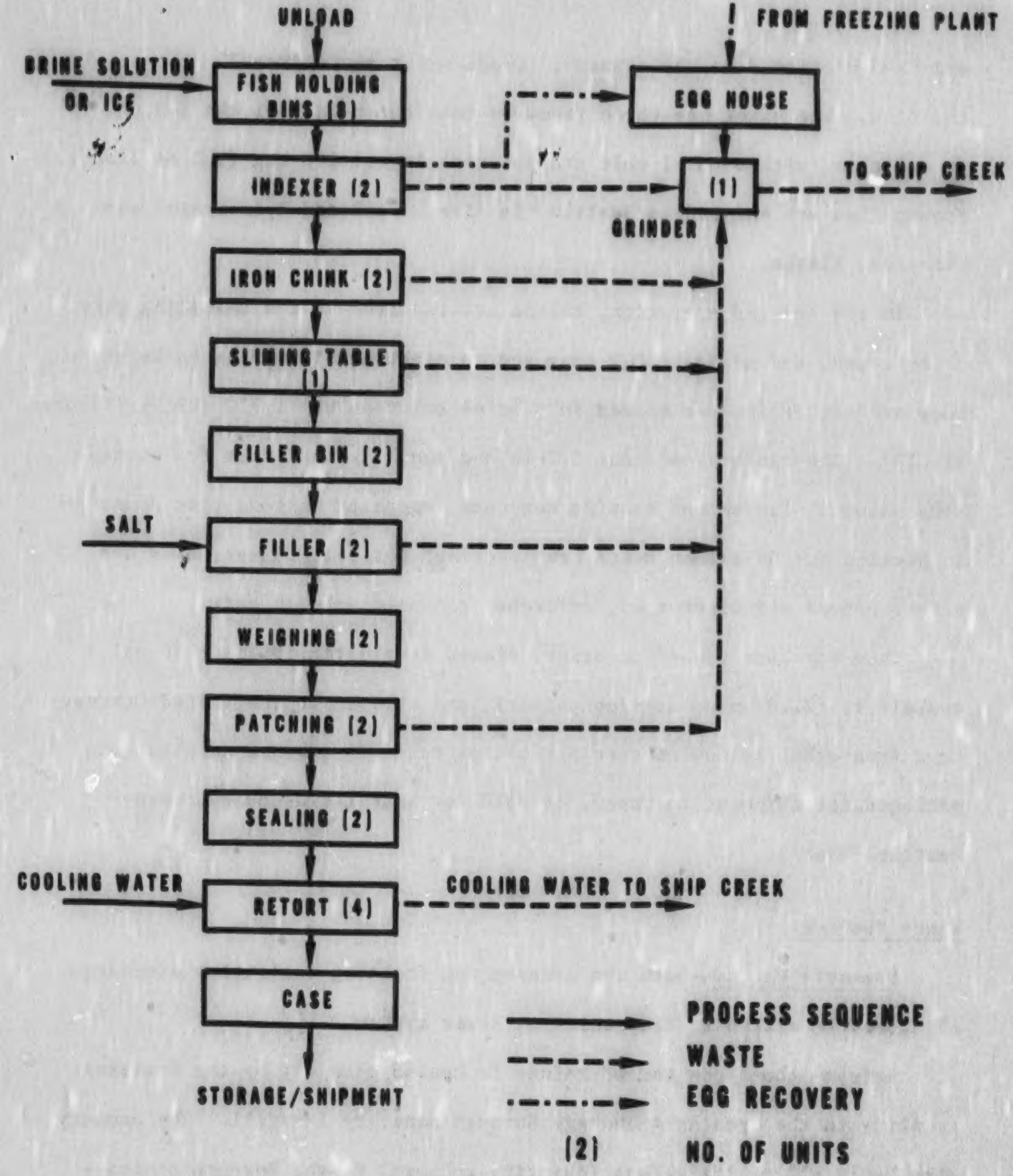
UNLOAD
FROM FREEZING PLANT
BRINE SOLUTION OR ICE
FISH HOLDING BINS (8)
EGG HOUSE
INDEXER (2)
(1)
GRINDER
TO SHIP CREEK
IRON CHINK (2)
SLIMING TABLE (1)
FILLER BIN (2)
SALT
FILLER (2)
WEIGHING (2)
PATCHING (2)
SEALING (2)
COOLING WATER
RETORT (4)
COOLING WATER TO SHIP CREEK
CASE
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(2)
NO. OF UNITS

Figure VI-C13. Whitney - Fidalgo Seafoods ,Inc.
Anchorage, Alaska Salmon Canning Sequence

Process Wastes--The concrete floors in the freezing facility contain flumes that flow to drains connected to the city sewer. Grates with 1 cm (0.5 in.) openings on top of the flumes retain solid wastes. Smaller screens cover the drains to catch additional material not previously caught. The freezing facility generates from 1.8 to 2.7 kkg (4,000 to 6,000 lb)/day of solid fish wastes (mostly viscera and heads) that are hauled to the cannery for disposal.

The major portion of the process wastes occurs in the butchering (fish house) and can filling (cannery) operations. All washwater and solids are flumed to the grinder at the dock face. The cannery discharges all process wastes from the fish house, cannery and freezing facility to Ship Creek which flows into Cook Inlet several hundred meters downstream from the cannery. Solids are ground in an Audio Model 801 grinder and discharged through a 7.5 cm (3 in.) diameter pipe above high tide. Washwater and process water are discharged through a 25 cm (10 in.) diameter pipe. The waste loads and wastewater characteristics reported in the RAPP application are listed in Table VI-C6.

Company officials estimate that between 34 and 36 kg (75 to 80 lb) of raw fish are required to produce one 21.8 kg (48 lb) case of salmon. Eggs are essentially the only material recovered, weighing about 3.9 kg (8.5 lb)/case. Based on the estimated production of 35,000 cases, the annual waste load would be about 544 kkg (1.2 million lb) which includes 2.3 kkg (5,000 lb) per day from the freezing facility. Assuming a 5-day week for a period of three months, the estimated average waste load would be 9.1 kkg (20,000 lb)/day.

TABLE VI-C6

WASTEWATER CHARACTERISTICS[a/]
WHITNEY-FIDALGO SEAFOODS, INC., ANCHORAGE, ALASKA

Parameter	Average Concentration[b/]	Average Load		Average Load[c/]	
		kg/day	lb/day	kg/case	lb/case
Flow, m^3/day (gpd)	170 (45,000)[d/]				
pH, su	6.9				
Temperature, C° (°F)	15.5 (60)				
BOD_5	6,500	111	244	0.23	0.5
COD	8,900	152	334	0.32	0.7
Total Solids	7,800	133	293	0.27	0.6
SS	3,400	58	128	0.11	0.25
NH_3 as N	24	0.45	1	0.0009	0.002
TKN as N	819	14	31	0.027	0.06
NO_3 as N	1.75				
Total phosphorus as P	125	2.3	5	0.005	0.01

---

a/ Data as reported in the company RAPP application.

b/ Values reported as mg/l except flow, pH, and temperature.

c/ Based on daily production of 500 cases. Values were not reported in RAPP application.

d/ Calculated from average concentration and average load.

Treatment Needs

The cannery wastes that are discharged to Ship Creek flow into the Cook Inlet. At low tide the wastes accumulate on the creek bank and in the creek bed. The outgoing tidal current removes the majority of the wastes, primarily because they have been ground and they therefore disperse well. During the survey solids were observed next to the dock below the grinder that were not being carried away by the tide. Because the cannery is adjacent to other business establishments at the city dock, general nuisance conditions can occur. Water quality conditions were not measured so the actual effects on Ship Creek are not known.

The waste stream should be screened to recover the solid material, and the liquid passing through the screen should be discharged through a submerged outfall extended into Cook Inlet below low mean tide. Whitney-Fidalgo Seafoods is considering the recovery of heads for pet food next year. Heads would be frozen and shipped to Anacortes, Wash. The remaining waste-fish solids could also be recovered, frozen, and shipped to either a reduction plant or the pet food operation. The company has also experimented with milt recovery. Although now discontinued, last year the milt was quick-frozen and sent to Europe.

D-1 ALASKA GLACIER SEAFOOD COMPANY, PETERSBURG, ALASKA

General

Alaska Glacier Seafood Company operates a shrimp and crab plant in Petersburg, Alaska [Figure VI-3]. The present plant was built in 1943 after the original plant was destroyed by fire. The plant layout is shown in Figure VI-D1. The plant is one of two remaining shrimp processing facilities in Alaska that hand pick shrimp. A U.S. Army Corps of Engineers Refuse Act Permit Program (RAPP) application for this plant has not been filed.

The Company, which employs between 25 and 30 people, operates an average of 6 hr/day, 6 days/week. Shrimp are processed from 1 May to 1 February; king crab are processed between 1 September and 30 December; tanner or snow crab from 15 October to 1 June; and dungeness crab April through December. Average production during 1973 was 295 kg (650 lb) of finished product per day. The maximum plant capacity was estimated to be 159 kkg (350,000 lb)/yr. During 1971 and 1972, 82 and 107 kkg (180,000 and 235,000 lb) of finished product, respectively, were processed. Company officials estimated that the 1973 production would be about 102 kkg (225,000 lb).

EPA personnel from the National Field Investigations Center-Denver and Region X, Seattle, visited this plant on 2 and 4 August 1973. Water quality studies were conducted by NFIC-D during the periods 6 to 9 and 21 to 25 August 1973. Dave Ohmer, owner, provided information and assistance.

Water Supply

All process and domestic waters are obtained from the city of Petersburg. Water is used for cooking, cooling, boiler feed and cleanup. Company

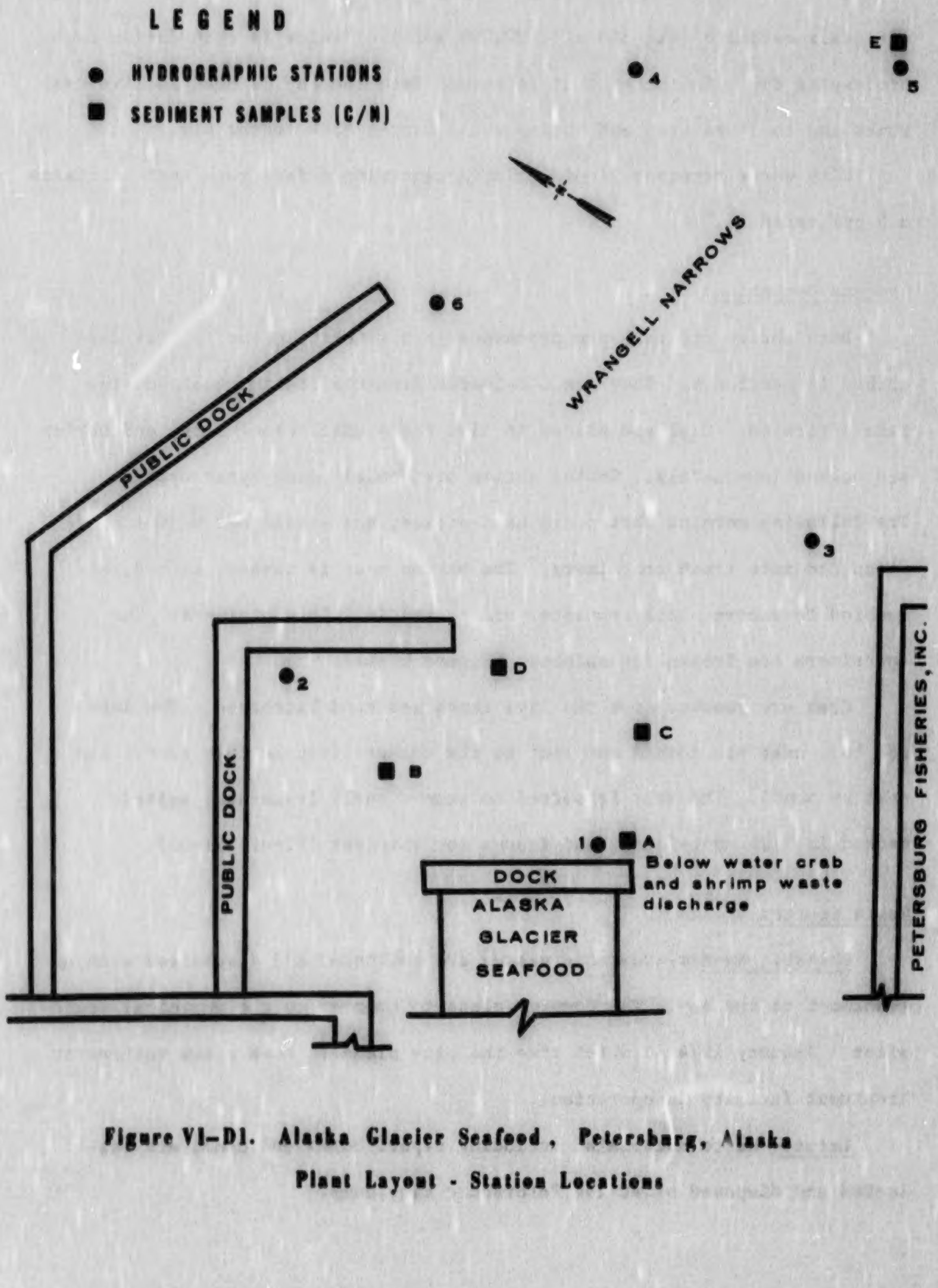
LEGEND
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)
1
2
3
4
5
6
A
B
C
D
E
WRANGELL NARROWS
PUBLIC DOCK
PUBLIC DOCK
DOCK
ALASKA GLACIER SEAFOOD
PETERSBURG FISHERIES, INC.
Below water crab and shrimp waste discharge

Figure VI-D1. Alaska Glacier Seafood, Petersburg, Alaska
Plant Layout - Station Locations

officials estimate that 380 m^3 (100,000 gal.) of water is used during each processing day. Saltwater that is pumped from the bay is used in live-crab tanks and to flume crab and shrimp shell wastes back to the bay.

City water receives liquid chlorination with a feed rate that maintains a 5 ppm residual.

Process Operations

Both shrimp and crab are processed in a manner similar to that described in Section V. They are off-loaded from the fishing boats during late afternoon. Crab are placed in live tanks until processing, and shrimp are cooked immediately. Cooked shrimp are cooled using spray nozzles. The following morning shrimp are hand picked, and shells and bodies are discarded into trash containers. The shrimp meat is washed, salted, air tumbled to remove shell remnants, and packed in 1 lb containers. The containers are frozen for shipment [Figure VI-D2].

Crab are removed from the live tanks and hand butchered. The legs and body meat are cooked and sent to the shakers (people that remove the meat by hand). The meat is sorted to remove shell fragments, salted, packed in 5 lb containers, and frozen for shipment [Figure VI-D2].

Waste Sources

Domestic Wastes--Domestic wastes are collected and discharged without treatment to the bay. The Company plans to connect to the municipal sewer after 1 January 1974 at which time the city plans to have a new wastewater treatment facility in operation.

Refuse--Waste materials, including paper, boxes and cans, are collected and disposed of at the Petersburg city dump.

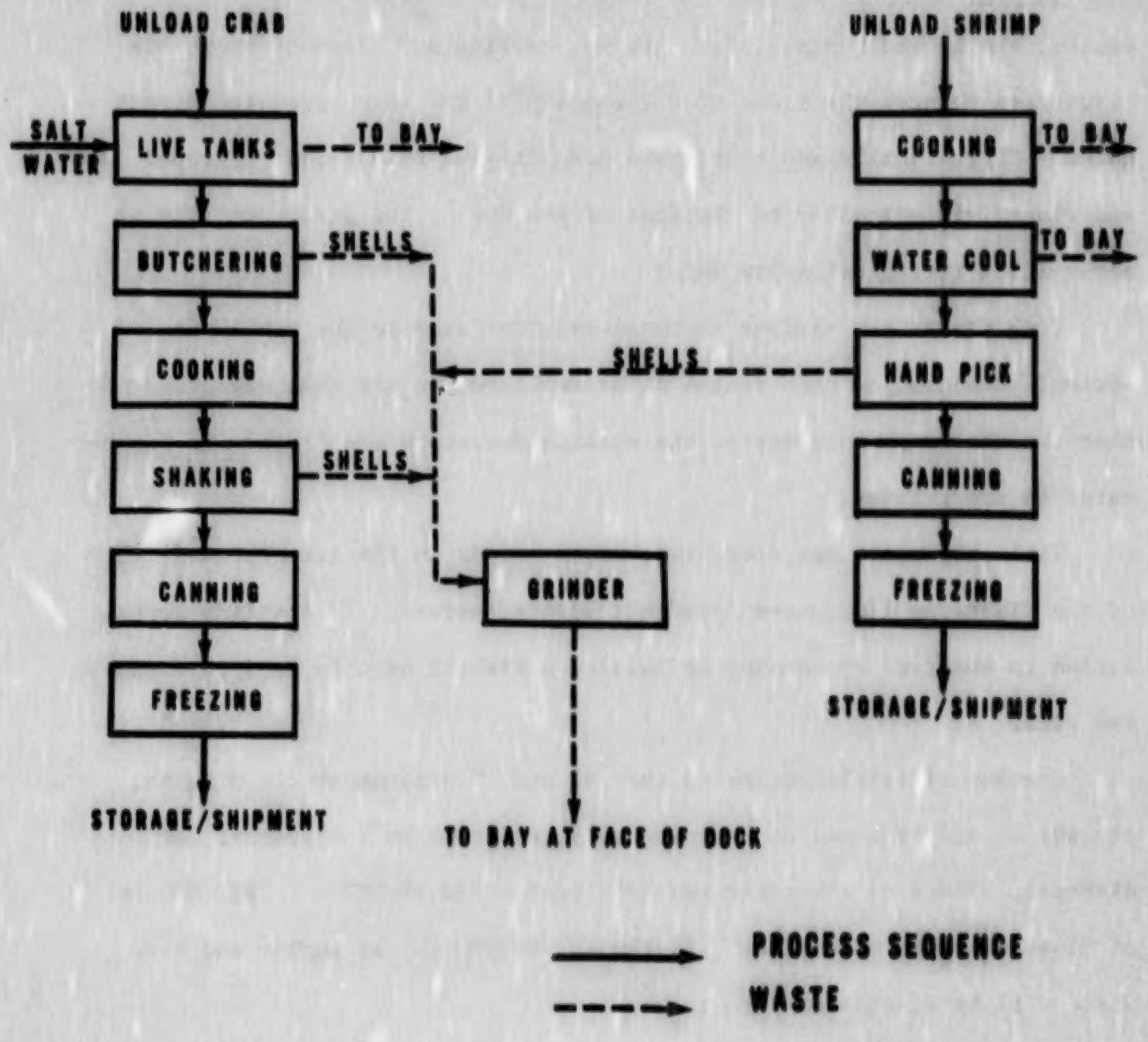
UNLOAD CRAB
SALT WATER
LIVE TANKS
TO BAY
BUTCHERING
SHELLS
COOKING
SHAKING
SHELLS
CANNING
FREEZING
STORAGE/SHIPMENT
GRINDER
TO BAY AT FACE OF DOCK
UNLOAD SHRIMP
COOKING
TO BAY
WATER COOL
TO BAY
HAND PICK
SHELLS
CANNING
FREEZING
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE

Figure VI-D2. Shrimp and Crab Processing Sequence, Alaska Glacier Seafood Co., Petersburg, Alaska

Process Wastes--Process wastes include cooking, cooling, and cleanup waters, shells and bodies. The cooking, cooling and cleanup waters are discharged through the floor of the cannery to the beach or water directly below. Shrimp shells and bodies are hand carried to a grinder, ground and flumed via saltwater to the face of the dock. The discharge line is about 2.5 m (8 ft) below low water.

Crab wastes are similar to those originating from the processing of shrimp. Disposal of crab wastes is accomplished in the same manner except that the shells removed during the shaking operation are flumed via freshwater to the grinder.

While the plant was operating, waste solids in the immediate vicinity of the discharge line accumulated but soon dispersed. If a solids accumulation is observed by Company officials, a fishing boat is used to disperse the pile.

Company officials estimated that 82 and 75 percent of the original raw shrimp and crab weight, respectively, are sent to the grinder for disposal. Based on the estimated 1973 production of 102 kkg (225,000 lb) of finished product, at least 454 kkg (1,000,000 lb) of shrimp and crab waste will be discharged into the bay.

Receiving Water Evaluations

Hydrographic and chemical data were obtained during 6 to 9 August 1973 in the vicinity of the plant [Figure VI-D1 and Table VI-D1]. Dissolved oxygen, pH, salinity, temperature, and transparency were measured at each station; bacteriological data were also obtained at selected stations. Data were collected at both high and low tides and at the surface

TABLE VI-D1

DESCRIPTION OF WATER QUALITY, *VIBRIO* AND SEDIMENT SAMPLING STATIONS ALASKA GLACIER SEAFOOD PETERSBURG, ALASKA

Map Key[a]	Description
	Water Quality Sampling Stations
1	Shrimp and crab waste discharge
2	Inside corner of N public dock
3	S corner of Petersburg Fisheries cold storage facility dock
4	Green flashing buoy #49
5	E shore, Wrangell Narrows, off old mink farm
6	End of N public floating dock
	Vibrio Sampling Stations
A (1)	Shrimp and crab waste discharge
E (5)	E shore, Wrangell Narrows, off old mink farm
	Sediment Sampling Stations
A	Shrimp and crab waste discharge
B	25 m SW of Station A
C	20 m WNW of Station A
D	30 m W of Station A

---

[a] Station locations are shown in Figure VI-D1.

and near the bottom with no significant difference in these parameters observed at any sampling location [Table VI-D2].

Sediment samples collected at the face of the dock (Station A) contained large accumulations of shellfish wastes. Chemical analyses of the samples yielded an organic carbon and nitrogen content of 4.7 and 0.89 percent, respectively (OSI 4.18). This would indicate that these wastes contained decomposing organic materials resulting in a high oxygen demand and release of nitrogen. Sediment samples collected at other stations were stabilized mud [Table VI-D3]. The lack of shellfish waste deposits away from the face of the dock indicates that the wastes are being adequately dispersed into the Wrangell Narrows by tidal currents.

TABLE VI-D3

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS PETERSBURG, ALASKA

Station[a]	Depth (meters)	Organic N (percent)	Organic C (percent)	OSI	Bottom Type
A	6.0	0.89	4.7	4.18	Shellfish Waste, Mud
B	6.0	0.01	0.7	0.01	Mud
C	6.0	0.15	1.3	0.20	Mud
D	6.0	0.16	0.8	0.13	Mud

[a] Station descriptions are given in Table VI-D1.

TABLE VI-D2

SUMMARY OF WATER QUALITY
PETERSBURG, ALASKA

		Range of Values			
		High Water		Low Water	
Parameter	Station No.[a]	Surface	Bottom	Surface	Bottom
DO, mg/1	1	8.4-9.0	8.3-8.5	8.7-9.9	7.5-9.6
	2	8.5-9.9	8.4-9.6	8.2-9.9	8.6-9.9
	3	8.5-8.9	8.7-8.9	8.9-9.8	8.2-9.7
	4	10.0-11.5	9.2-9.7	9.0-10.0	9.1-9.8
	5	9.7-11.4	9.2-9.5	9.1-11.7	8.6-9.8
	6	8.4-8.9	8.7-9.5	9.0-10.2	8.4-10.0
Temperature °C	1	9.0-10.0	8.5-9.0	9.0-10.0	9.0-9.0
	2	9.0-10.0	8.5-9.0	9.5-10.0	9.0-9.5
	3	9.0-10.0	8.5-9.0	9.5-10.0	9.0-9.5
	4	8.5-10.0	7.5-8.5	9.5-10.0	8.5-10.0
	5	8.0-10.0	8.0-8.5	10.0-10.0	8.5-9.0
	6	9.5-10.0	8.0-8.5	9.0-9.5	8.5-9.0
Salinity, ppt	1	18.6-19.8	19.5-20.5	17.0-20.0	18.1-19.8
	2	16.0-20.2	19.9-20.0	16.5-19.0	19.0-19.2
	3	18.5-20.0	19.5-20.0	16.7-20.0	18.8-20.0
	4	18.5-21.0	19.0-20.5	19.0-20.2	19.0-19.5
	5	18.5-20.2	20.1-20.5	19.0-20.3	19.0-20.0
	6	19.1-20.5	20.0-20.0	18.0-18.8	19.0-19.5
pH	1	8.2-8.5	8.0-8.5	7.7-8.5	8.0-8.5
	2	8.4-8.5	8.0-8.5	8.0-8.7	8.0-8.6
	3	8.3-8.5	8.5-8.5	8.0-8.6	8.0-8.7
	4	8.5-8.7	8.0-8.7	7.8-8.6	8.0-8.7
	5	8.5-8.7	8.5-8.7	8.0-8.6	8.0-8.7
	6	8.5-8.5	8.5-8.5	8.5-8.7	8.5-8.6
Transparency		3 to 4 m			

---

[a] See Table VI-D1 for station descriptions.

Bacteriological analyses showed that the effluent contained log mean total- and fecal-coliform densities of 800 and 170/100 ml, respectively [Table VI-D4]. Low coliform densities were also obtained at all receiving water stations which would indicate that the wastes contribute very little bacterial contamination to the area.

The shrimp and crab wastes and receiving water in the vicinity of the discharge contained both Vibrio parahaemolyticus and V. alginolyticus in two of ten samples.* The density of each organism was 36/100 g in the waste discharge and 4/100 ml in the adjacent receiving waters [Table VI-D4]. Background samples of water and sediment collected from remote areas and sediment samples collected from stations immediately adjacent to the waste discharges did not contain Vibrio. The low densities of Vibrio detected in this area would not be considered a hazard to commercial marine species.

Treatment Needs

Petersburg Fisheries, Inc. is constructing a waste reduction plant that has the capacity for processing all solid fish, crab, and shrimp wastes generated in the Petersburg area. To eliminate the buildup of crab and shrimp shells in the vicinity of the outfall, Alaska Glacier Seafood Company is planning to send crab and shrimp shells to the Petersburg Fisheries plant for processing. The manner in which these solids will be transported had not been determined at the time of the survey. However, removal of these solids will eliminate the buildup observed during the water quality investigation.

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*For a discussion on Vibrio see Appendix D.

SUMMARY OF BACTERIOLOGICAL RESULTS
ALASKA GLACIER SEAFOOD COMPANY
PETERSBURG, ALASKA
6 to 9 AUGUST 1973

		Coliforms MPN/100 ml					
		Total Coliforms			Fecal Coliforms		
Map Key[a]	Station Description	Minimum	Maximum	Logarithmic Mean	Minimum	Maximum	Logarithmic Mean
4	Background station at #49 green flashing buoy	17	79	35	4	8	6
1	Shrimp and crab waste discharge	330	2,300	800	17	790	170
2	Inside corner of N Public floating dock	3,300	24,000	6,000	110	2,800	730
3	S corner of Petersburg Fisheries cold storage facility dock	14	490	84	2	330	26
6	End of N public floating dock	130	2,400	470	11	2,400	150

		Vibrio MPN/100 ml or g			
		Sample Type	Date	Isolate	Density
E(5)	Background station, E shore, Wrangell Narrows, adjacent to old mink farm	Sediment	6 Aug 73	No *Vibrio* Isolated	—
		Water	6 Aug 73	No *Vibrio* Isolated	—
A(1)	Below waste discharge	Sediment	6 Aug 73	No *Vibrio* Isolated	—
			8 Aug 73	No *Vibrio* Isolated	—
			9 Aug 73	No *Vibrio* Isolated	—
A(1)	Waste discharge	Crab & shrimp waste	6 Aug 73	No *Vibrio* Isolated	—
			8 Aug 73	No *Vibrio* Isolated	—
			9 Aug 73	*V. parahaemolyticus*	36/100 g
				V. alginolyticus	36/100 g
A(1)	Waste discharge	Water	6 Aug 73	No *Vibrio* Isolated	—
			8 Aug 73	*V. parahaemolyticus*	4/100 ml
			8 Aug 73	*V. alginolyticus*	4/100 ml

---

[a] Station locations are shown in Figure VI-D1.

D-2 ANNETTE ISLAND PACKING COMPANY, METLAKATLA, ALASKA

General

Annette Island Packing Company, a salmon cannery and cold storage facility, is owned as a city enterprise of the Metlakatla Indian community [Figure VI-3]. The layout of the present plant facilities is shown in Figure VI-D3.

The cannery employs over 100 people. It processes salmon from July to September each year. The cannery has been operating less than 8 hr/day, 4 days/week this year. Company representatives estimated that they were processing about 90 percent pink, 8 percent chum and 2 percent other species of salmon. Average production capability of the plant was estimated to be 2,000 cases/day with a maximum plant capacity of 4,500 cases/day. As of 9 August about 20,000 cases* had been packed in the 1973 season. Salmon production for 1968, 1970 and 1972 was 98,000, 60,000 and 54,000 cases, respectively.

The cold storage facility employs 30 people. The facility operates from April to November, processing halibut, salmon, black cod and herring. Production figures furnished by company personnel estimate that during 1973 the facility will process 1,135 kkg (2,500,000 lb) of fish. This figure is considerably higher than the production for 1971 and 1972, when the plant processed 365 and 570 kkg (800,000 and 1,250,000 lb) of fish, respectively.

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* One case of salmon weighs 21.8 kg consisting of 48 one-lb cans.

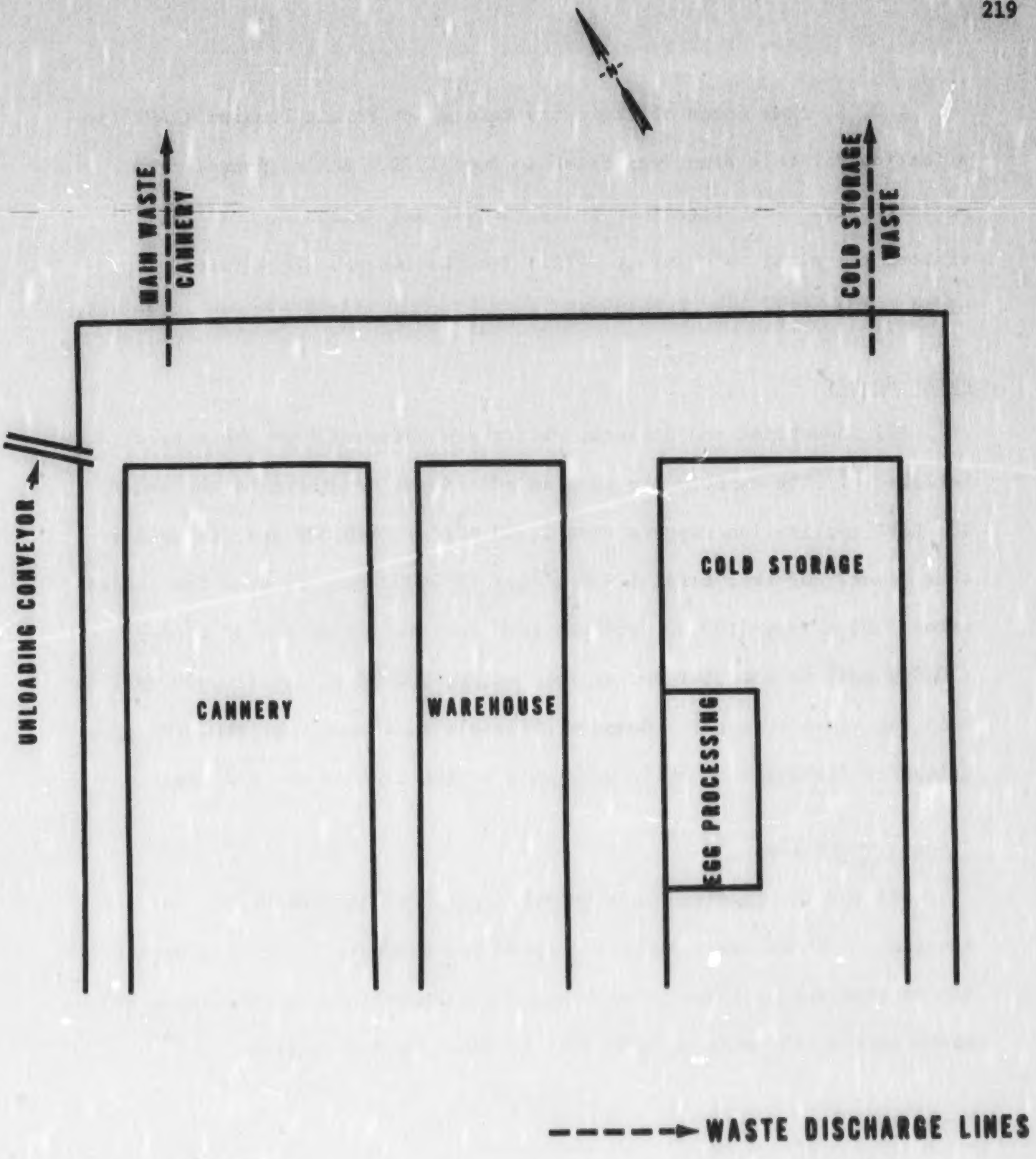
MAIN WASTE
CANNERY
COLD STORAGE
WASTE
UNLOADING CONVEYOR
CANNERY
WAREHOUSE
COLD STORAGE
EGG PROCESSING
WASTE DISCHARGE LINES

Figure VI–D3. Annette Island Packing Co., Metlakatla, Alaska
Plant Layout

A U. S. Army Corps of Engineers Refuse Act Permit Program (RAPP) application for this plant was filed 16 June 1971. EPA personnel from National Field Investigations Center-Denver and Region X, Seattle, visited the plant on 9 August 1973. Fred Gunderson, plant foreman, provided information and assistance.

Water Supply

All industrial and domestic waters are obtained from the city of Metlakatla. The cannery provides no additional treatment to the water. The RAPP application reports that 2,400 m^3/day (640,000 gpd) is used by this plant. Of this total 1,970 m^3/day (520,000 gpd) is used for process water, 380 m^3/day (100,000 gpd) is used for cooling water, 38 m^3/day (10,000 gpd) is used for boiler feed water, and 38 m^3/day (10,000 gpd) is used for domestic water. Company officials indicated that the RAPP application figures were still realistic at the time of the EPA visit.

Process Operations

Salmon are processed in a manner typical of that described in Section V. Heads are neither recovered nor processed. Canning operations are carried out on three lines operating in parallel. A processing and waste source schematic of the plant is shown in Figure VI-D4.

Waste Sources

Domestic Wastes--All domestic wastes from the cannery and the cold storage facility are discharged to the Metlakatla city sewer.

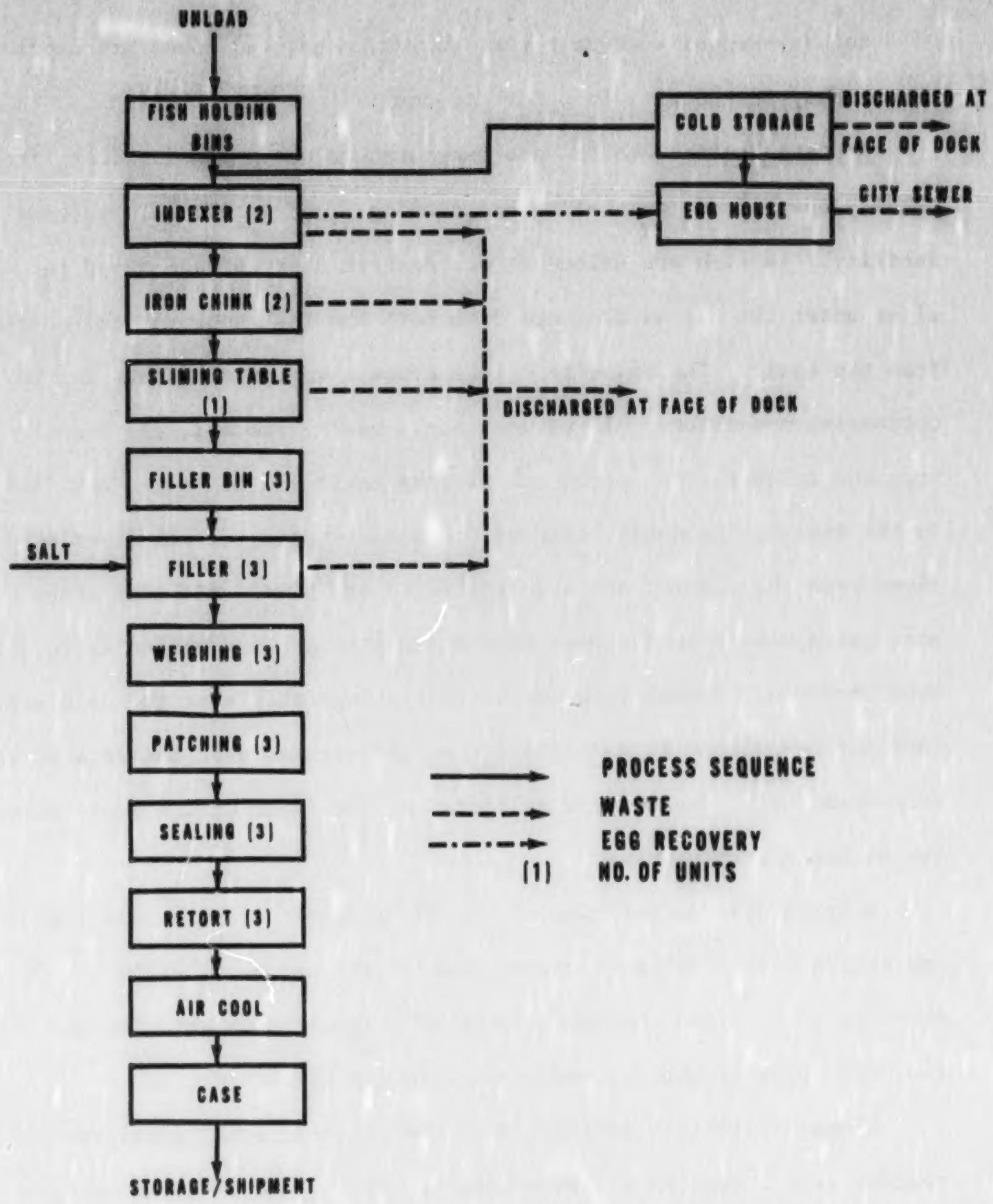
UNLOAD
FISH HOLDING BINS
COLD STORAGE
DISCHARGED AT FACE OF DOCK
INDEXER (2)
EGG HOUSE
CITY SEWER
IRON CHINK (2)
SLIMING TABLE (1)
DISCHARGED AT FACE OF DOCK
FILLER BIN (3)
SALT
FILLER (3)
WEIGHING (3)
PATCHING (3)
SEALING (3)
RETORT (3)
AIR COOL
CASE
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(1) NO. OF UNITS

Figure VI-D4. Salmon Processing Sequence, Annette Island Packing Co., Metlakatla, Alaska

Refuse--Wastes such as paper, boards, cans, and boxes are hauled by the company to the city dump for disposal.

Process Wastes--Wastes are generated at the unloading dock, from cannery operations (butchering and canning), and in the cold storage facility. As fish are unloaded, wastewaters that contain blood and slime enter the bay as drainage from both the fish conveyor and pumpage from the boats. The majority of the process wastes originate in the butchering operation. All wastes (e.g., heads, viscera, and blood) from the indexer, iron chink and sliming table are collected and flumed to the face of the dock. Canning operation wastes and all floor drain flows from the cannery are also collected and flumed with the other processing wastes to the dock face where they are discharged above the water surface. Wastes from the butchering operations at the cold storage facility are placed in containers that are emptied over the face of the dock when full. Wastewaters collected by the floor drains empty into the Metlakatla city sewer.

Observations at the time of the EPA in-plant visit showed that scum and solids were visible on the surface of the bay at least 90 m (300 ft) from the dock. This condition could be eliminated by grinding and subsurface discharge of process wastewaters in the bay.

Company officials estimate that the waste material generated from processing salmon that have been caught by seining and trolling methods to be 25 and 8 percent, respectively. About 10 percent of the original halibut weight is discharged as waste material.

Treatment Needs

Process wastes from the cannery and cold storage facility should be ground and discharged into the bay. The discharge line should be located on the bottom, at least 15 m (50 ft) from the face of the dock, to help prevent scum and floating solids from occurring on the surface.

D-3 COASTAL GLACIER SEAFOODS, HOONAH, ALASKA

General

Coastal Glacier Seafoods [Figure VI-3], a crab processing plant built in 1950, processes king, snow (also known as tanner or queen) and dungeness crab from April to November each year. The plant operates an average of 5 days/week, 7 hr/day, and employes about 55 people. Average production is 4.5 kkg (10,000 lb)/day with a plant capacity of 5.4 kkg (12,000 lb)/day. Production figures for 1971 and 1972, and estimated figures for 1973 are tabulated below:

Species	Production					
	1971		1972		1973	
	(kkg)	(lb)	(kkg)	(lb)	(kkg)	(lb)
King Crab	None	None	16	35,000	23	50,000
Snow Crab	45	100,000	136	300,000	113	250,000
Dungeness Crab	136	300,000	215	457,000	340	750,000

The company plans to modernize the plant which will increase production by 20 percent. The layout of the present plant facilities is shown in Figure VI-D5.

A U. S. Army Corps of Engineers Refuse Act Permit Program (RAPP) application for this plant was filed 29 June 1971. EPA personnel from National Field Investigations Center-Denver and Region X, Seattle, visited the plant on 5 and 7 August 1973. Water quality studies were conducted 11 through 14 August. Mr. Cal Boord, president, and Mr. Peterson, plant manager provided information and assistance.

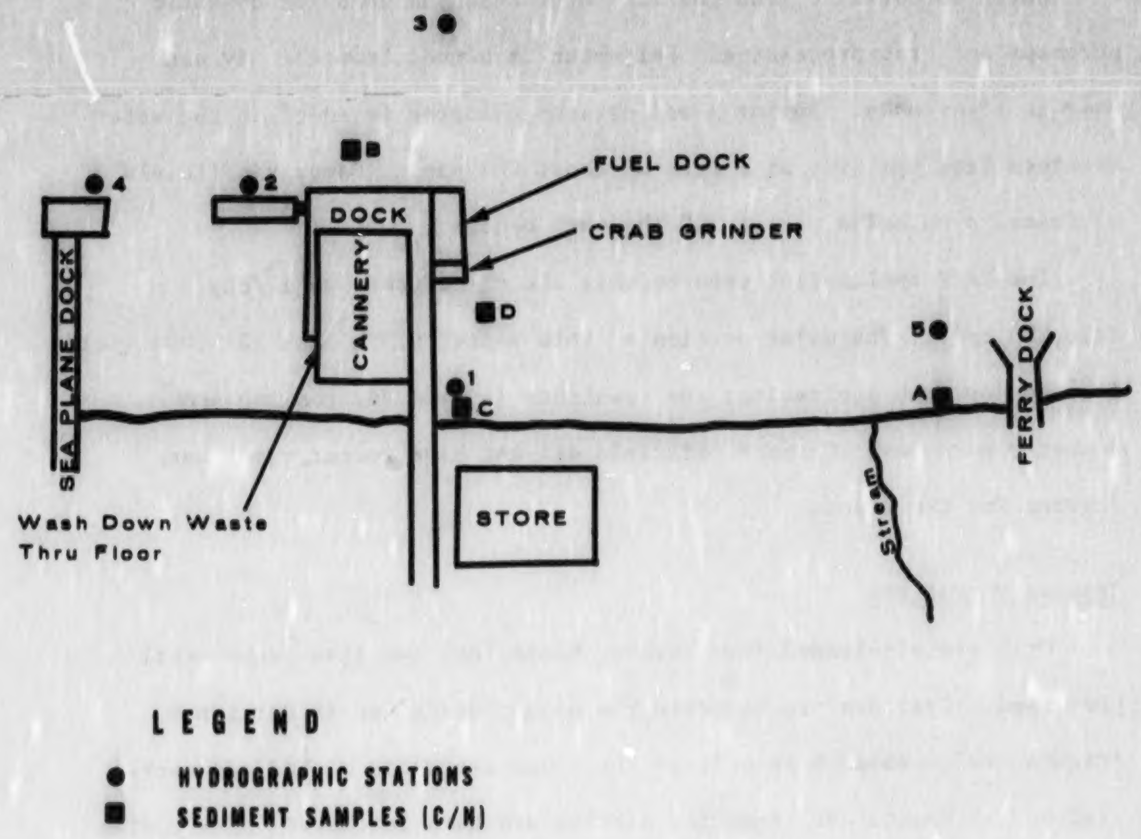
3
B
FUEL DOCK
4
2
DOCK
CRAB GRINDER
CANNERY
SEA PLANE DOCK
D
5
1
C
A
FERRY DOCK
STORE
Stream
Wash Down Waste
Thru Floor
LEGEND
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)

Figure VI–D5. Coastal Glacier Seafoods, Hoonah, Alaska
Plant Layout - Station Locations

Water Supply

Water is obtained from the city of Hoonah and used for domestic purposes and crab processing. Saltwater is pumped from the bay and used in live tanks. During plant cleanup chlorine is added to the water obtained from the city at a rate of about 200 ppm. Company officials estimated a chlorine use of 200 lbs each season.

The RAPP application reports that the plant uses 945 m^3/day (250,000 gpd). The major portion of this water, 925 m^3/day (245,000 gpd), is used for crab processing; the remainder is used for cooling and domestic purposes. Company officials did not have recent water use figures for the plant.

Process Operations

Crab are off-loaded from fishing boats into two live tanks until processed. Crab are processed in the manner described in Section V [Figure V-2]. About 5 percent of the crabs are whole cooked and packaged for shipment; the remaining portion are hand butchered. The bodies are discarded and the legs and body meat are placed in a cooker. The cooked body parts are cooled in a water bath, the meat is removed by hand, and the shells are discarded on the floor. The meat then passes through a brine water rinse to add salt and through ultraviolet light for workers to remove shell fragments. After rinsing, the meat is packaged in 5 lb containers and frozen.

Waste Sources

Domestic Wastes--The cannery domestic wastes are discharged directly into the bay without treatment. Company officials stated that later this year those wastes will be collected in a 10 cm (4 in.) line and discharged at the face of the dock. As soon as the city constructs its new wastewater treatment facility, the line will be connected to the city sewer.

Refuse--Waste materials, including paper, boxes, and cans, are collected weekly by the city and taken to the city dump for disposal. The refuse waste generated each week usually fills two 115 liter (30 gal.) containers.

Process Wastes--Wastes from processing operations are generated primarily during cooking and cooling of the crab and cleanup at the end of the day. The wastewater from the cooking and cooling operations, as well as from the brine and freshwater rinses, is discharged through the cannery floor to the water. Cleanup water, dosed at 200 ppm of chlorine, flows through several floor drains to the water underneath.

Crab shells and bodies are ground on the dock and allowed to fall into the water below. Visual observations showed that a large buildup of crab shells existed below the grinder. This pile of shells is exposed at low mean tide. According to company officials 80 percent of the crab, in the form of body and shell, becomes waste material.

Receiving Water Evaluation

Hydrographic and chemical data were obtained from 11 through 14 August

1973 in the vicinity of the crab processing plant [Figure VI-D5 and Table VI-D5]. Sediment samples and bacteriological and Vibrio data were also obtained at selected stations. Measurements for dissolved oxygen, pH, temperature, salinity and transparency were made at each station during high and low tides at the surface and near the bottom [Table VI-D6]. With the exception of salinity, none of these parameters varied significantly at the sampling locations. Salinity measurements were influenced at some stations during low slack tide as a result of freshwater river discharges to the bay.

Sediment samples collected at the point of discharge were completely composed of crab wastes. All other samples were of stabilized mud and sand [Table VI-D7].

TABLE VI-D7

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS
HOONAH, ALASKA

Station[a]	Depth (meters)	Organic N (percent)	Organic C (percent)	OSI	Bottom Type
A	7.5	0.06	0.2	0.02	Mud, Sand
B	10.5	0.29	1.1	0.32	Mud
C	Tidal Flat	0.01	0.2	0.01	Mud, Sand
D	1.5	-	-	--	Total Crab Waste

[a] Station descriptions are given in Table VI-D5.

TABLE VI-D5

DESCRIPTION OF WATER QUALITY, VIBRIO AND SEDIMENT SAMPLING STATIONS, COASTAL GLACIER SEAFOODS HOONAH, ALASKA

Map Key[a/]	Description
	Water Quality Sampling Stations
1	20 m inshore of crab waste discharge
2	At public floating dock, adjacent to cannery
3	30 m offshore of cannery dock
4	Adjacent to seaplane dock
5	Background station, adjacent to ferry dock
	Vibrio Sampling Stations
A (5)	Background station, adjacent to ferry dock
C (1)	20 m inshore of crab waste dischrge
D	Crab waste discharge
	Sediment Sampling Stations
A (5)	Background station, adjacent to ferry dock
B	End of cannery dock
C (1)	20 m inshore of crab waste discharge
D	Crab waste discharge

---

a/ Station locations are shown in Figure VI-D5.

TABLE VI-D6

SUMMARY OF WATER QUALITY
HOONAH, ALASKA

		Range of Values			
	Station	High Water		Low Water	
Parameter	No.[a]	Surface	Bottom	Surface	Bottom
DO, mg/l	1	9.5-10.3	9.0-10.4	9.2-9.5	9.3-9.8
	2	9.8-10.1	7.9-10.2	9.0-9.6	9.2-10.2
	3	9.7-10.6	7.9-8.4	9.2-9.9	7.9-8.8
	4	9.8-10.5	7.9-10.5	8.6-9.2	9.3-9.9
	5	9.4-10.5	8.0-8.4	9.2-9.6	8.6-9.5
Temperature °C	1	11.0-11.5	9.0-11.0	9.0-10.5	10.0-10.5
	2	11.0-11.5	8.5-11.0	9.0-10.5	9.5-10.0
	3	11.0	8.5-9.0	9.0-10.5	8.5
	4	11.0	8.5-11.0	9.5-10.5	10.0-10.5
	5	11.0-12.0	8.5-9.0	9.0-11.0	8.5-10.0
Salinity, ppt	1	16.0-22.0	21.0-23.0	11.5-16.5	18.5-21.5
	2	17.0-22.0	21.5-22.5	8.5-15.5	17.0-21.5
	3	17.0-22.0	21.5-22.5	4.4-16.0	20.5-22.5
	4	17.0-22.0	20.5-22.5	13.0-14.5	20.4-22.0
	5	18.0-22.0	21.5-22.0	13.0-16.5	21.0-22.5
pH	1	8.5-8.7	8.0-8.7	8.5	8.5
	2	8.5-8.8	8.5-8.7	8.5	8.5
	3	8.7-9.0	8.5	8.0-8.7	8.5
	4	8.5-8.7	8.0-8.7	8.5	8.5-8.7
	5	8.5-8.7	8.5	8.5-8.7	8.5-8.7
Transparency		2 to 4 m			

---

a/ See Table VI-D5 for station descriptions.

The lack of crab waste deposits away from the point of discharge indicates the wastes are adequately dispersed into the bay by tidal currents.

Bacteriological analyses showed the receiving water to be of moderate to good quality [Table VI-D8]. The station, 25 m (75 ft) inshore of the crab waste discharge, was influenced by the raw sewage discharge from the plant. Vibrio* was isolated from the crab wastes discharged to receiving water and found in the sediment [Table VI-D8]. The very low densities of Vibrio that were isolated from the cannery indicate a minimal health threat to marine species in the area.

Treatment Needs

The Company plans to construct a new treatment system that will include a grinder, holding tank, pump and outfall line. The outfall line will be about 15 m (50 ft) long and extend into the tidal area. The end of the line will be about 8 m (25 ft) below low low water. This proposed treatment system is needed to eliminate the existing buildup of crab shells near the dock.

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* For a discussion on Vibrio see Appendix D.

TABLE VI-D8
SUMMARY OF BACTERIOLOGICAL RESULTS
COASTAL GLACIER SEAFOODS
HOONAH, ALASKA
11-14 AUGUST 1973

		Coliforms MPN/100 ml					
		Total Coliforms			Fecal Coliforms		
Map Key[a/]	Station Description	Minimum	Maximum	Logarithmic Mean	Minimum	Maximum	Logarithmic Mean
5	Background stations, adjacent to ferry dock	790	4,900	2,300	330	790	570
1	20 m inshore of crab waste discharge	4,900	92,000	13,000	490	22,000	1,700
2	At public floating dock, adjacent to cannery	790	3,300	1,400	230	1,300	620
4	Adjacent to seaplane dock	460	3,300	980	170	490	300

		Vibrio MPN/100 ml or g			
		Sample Type	Date	Isolate	Density
A	Background station, adjacent to ferry block	Sediment	11 Aug 73	No *Vibrio* Isolated	—
		Water	11 Aug 73	No *Vibrio* Isolated	—
C	20 m inshore of crab waste discharge	Sediment	11 Aug 73	No *Vibrio* Isolated	—
			13 Aug 73	*V. alginolyticus*	36/100 g
			14 Aug 73	*V. alginolyticus*	36/100 g
D	Crab waste at grinder discharge	Crab Waste	11 Aug 73	No *Vibrio* Isolated	—
			13 Aug 73	No *Vibrio* Isolated	—
			14 Aug 73	*V. alginolyticus*	36/100 g
D	Crab waste discharge	Water	11 Aug 73	No *Vibrio* Isolated	--
			13 Aug 73	*V. alginolyticus*	15/100 ml

a/ Station locations are shown in Figure VI-D5.

D-4. E. C. PHILLIPS AND SON, INC., KETCHIKAN, ALASKA

General

E. C. Phillips and Son, Inc. operates a cold storage plant in Ketchikan, Alaska. The plant was constructed in 1950 on the Tongass Narrows [Figure VI-3]. Salmon, halibut, herring and black cod are the major fish processed. The plant is open the entire year and the majority of the fish are processed from May to September.

The plant employs from 10 to 60 people. It operates 9 hr/day during the summer, with winter operation on an as-needed basis. The annual production of fish for 1971 and 1972 is tabulated below:

Species	Delivery Weight			
	1971		1972	
	(kg)	(lb)	(kg)	(lb)
Halibut	490	1,080,910	182	400,571
Sablefish	26	58,136	21	47,212
Salmon-king	117	258,753	111	244,881
-sockeye	100	219,535	53	116,390
-silver	131	288,179	249	549,472
-pink	119	262,213	132	290,430
-chum	107	234,877	183	402,534
-steelhead	0.27	603	0.50	1,108
Herring	171	377,500	207	457,200
Miscellaneous	0.27	592	4	8,833
Total	1,262	2,781,298	1,142	2,518,631

Company officials estimated the total fish weight processed during 1973 will be less than that in 1972.

A U.S. Army Corps of Engineers Refuse Act Permit Program (RAPP) application for this plant was filed in 1972. EPA personnel from National Field Investigations Center-Denver and Region X, Seattle visited the plant on 8 August 1973. Paul Ohashi, bookkeeper, and Phil Jeans, plant manager, provided information and assistance.

Water Supply

All industrial and domestic water is obtained from the city of Ketchikan and chlorinated before use. Information obtained from the RAPP application indicated that 163 m^3/day (43,000 gpd) is used by the plant. Of this total, 110 m^3/day (30,000 gpd) is used for cooling water and 53 m^3/day (13,000 gpd) for process water.

Process Operations

Fish are off-loaded from fishing boats. Herring and cod are received, frozen and shipped without generating waste. Salmon and halibut are hand butchered, cleaned, frozen and shipped. The heads, eggs and milt of the salmon are saved. The remaining wastes are ground and discharged to the bay.

Waste Sources

Domestic Wastes--All domestic wastes are collected and discharged into the bay without treatment. The location of the discharge line allows the wastes to enter the bay below low tide water.

Although the city has wastewater collection lines, the company has not connected to the municipal sewer since the city also discharges untreated wastewater into the bay. It was reported that the city plans to construct a new wastewater treatment facility.

Refuse--Waste materials such as paper, boxes and cans, are collected in 50 gal. barrels and hauled to the city dump for disposal. About 5 barrels are filled during each week of operation.

Process Wastes--Wastes are generated at the unloading dock and in the butchering area. Fish are washed as received and the wastewater containing blood and slime enters the bay through the wooden floor of the butchering area.

Blood, fish parts, and viscera from all process operations are collected, ground, and discharged through an opening in the floor into the water under the plant. The level of waste generated was estimated to be 5 percent of the incoming weight. This would amount to about 57 kkg (125,000 lb) of fish wastes per year.

Treatment Needs

The fish wastes are ground and discharged into the water under the plant. Although wastes were not being discharged during the plant visit, it can be assumed that floating solids result from this method of disposal. These wastes should be screened to recover the solid material; the liquid passing through the screen should be discharged into the bay below low low tide in an area where adequate dispersion occurs.

D-5. NEW ENGLAND FISH COMPANY, CHATHAM, ALASKA

General

The New England Fish Company owns and operates a salmon cannery at Chatham, Alaska [Figure VI-3]. Constructed in 1898, the cannery is the second oldest in Alaska. The plant layout is shown in Figure VI-D6.

The cannery is open from mid-July to mid-August. It employs 140 people and has been operating less than 8 hr/day, 3 to 4 days/week. Average production in 1973 ranged from 1,000 to 2,000 cases/day. The plant capacity is 4,000 cases/day. As of 7 August 1973, 31,000 cases had been packed, of which about 85 percent were pink and 15 percent chum salmon. The Company estimated 50,000 cases would be packed during the 1973 season. The annual production since 1968 has varied as a result of fishing restrictions imposed by regulatory agencies and the availability of salmon. Production figures for 1968 to 1972 are listed below.

Year	Annual Production (cases)
1968	140,000
1969	79,000
1970	83,000
1971	70,000
1972	62,000

A U.S. Army Corps of Engineers Refuse Act Permit Program (RAPP) application for this plant was filed 18 June 1971. EPA personnel from National Field Investigations Center-Denver and Region X, Seattle visited the plant on 7 August 1973. Water quality studies were conducted by NFIC-D personnel from 26 to 28 June and 16 to 18 August.

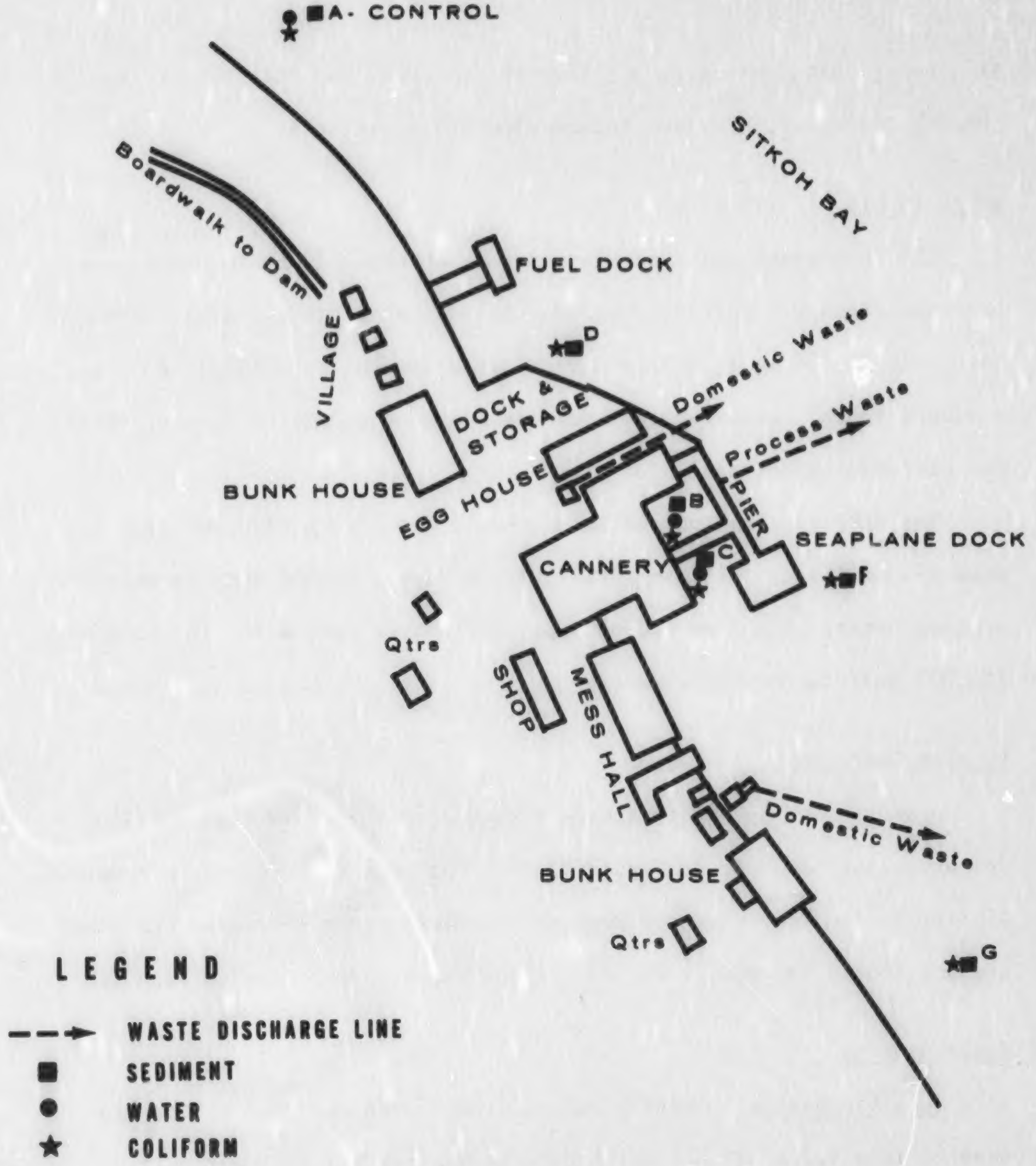
A- CONTROL
SITKOH BAY
Boardwalk to Dam
FUEL DOCK
VILLAGE
D
Domestic Waste
DOCK & STORAGE
Process Waste
BUNK HOUSE
EGG HOUSE
B
PIER
SEAPLANE DOCK
CANNERY
C
F
Qtrs
SHOP
MESS HALL
Domestic Waste
BUNK HOUSE
Qtrs
G
LEGEND
WASTE DISCHARGE LINE
SEDIMENT
WATER
COLIFORM

Figure VI–D6. New England Fish Company, Chatham, Alaska
Plant Layout - Bacteriological Stations

Al O'Leary, plant manager, Don Freeman, foreman, and Rick Dutton, quality control (Seattle), provided information and assistance.

Water Supply

All industrial and domestic water is obtained from a manmade lake near the cannery. There is no domestic habitation in the area of the lake. About 3.6 kg (8 lb)/day of chlorine is used to maintain a 3 ppm residual in the water supply. Samples are sent weekly to Juneau, Alaska for bacteriological analysis.

The RAPP application indicates that 1,440 m^3/day (380,000 gpd) is used by the plant. Of this total 1,325 m^3/day (350,000 gpd) is used for process water, 75 m^3/day (20,000 gpd) for boiler feed water and 40 m^3/day (10,000 gpd) for domestic water.

Process Operations

A processing and waste source schematic for the New England Fish Company plant is shown in Figure VI-D7. Salmon are processed in a manner similar to that described in Section V. Milt is not recovered and heads are not cooked to recover the oils. The cannery uses four filling lines.

Waste Sources

Domestic Wastes--Domestic wastes from the cannery and office are treated in a 4.7 m^3 (1,250 gal.) package wastewater treatment unit. Wastewaters from the dormitories, kitchens and houses are treated in a 19 m^3 (5,000 gal.) package unit. The effluent from each unit is chlorinated, then discharged at the bottom of the bay.

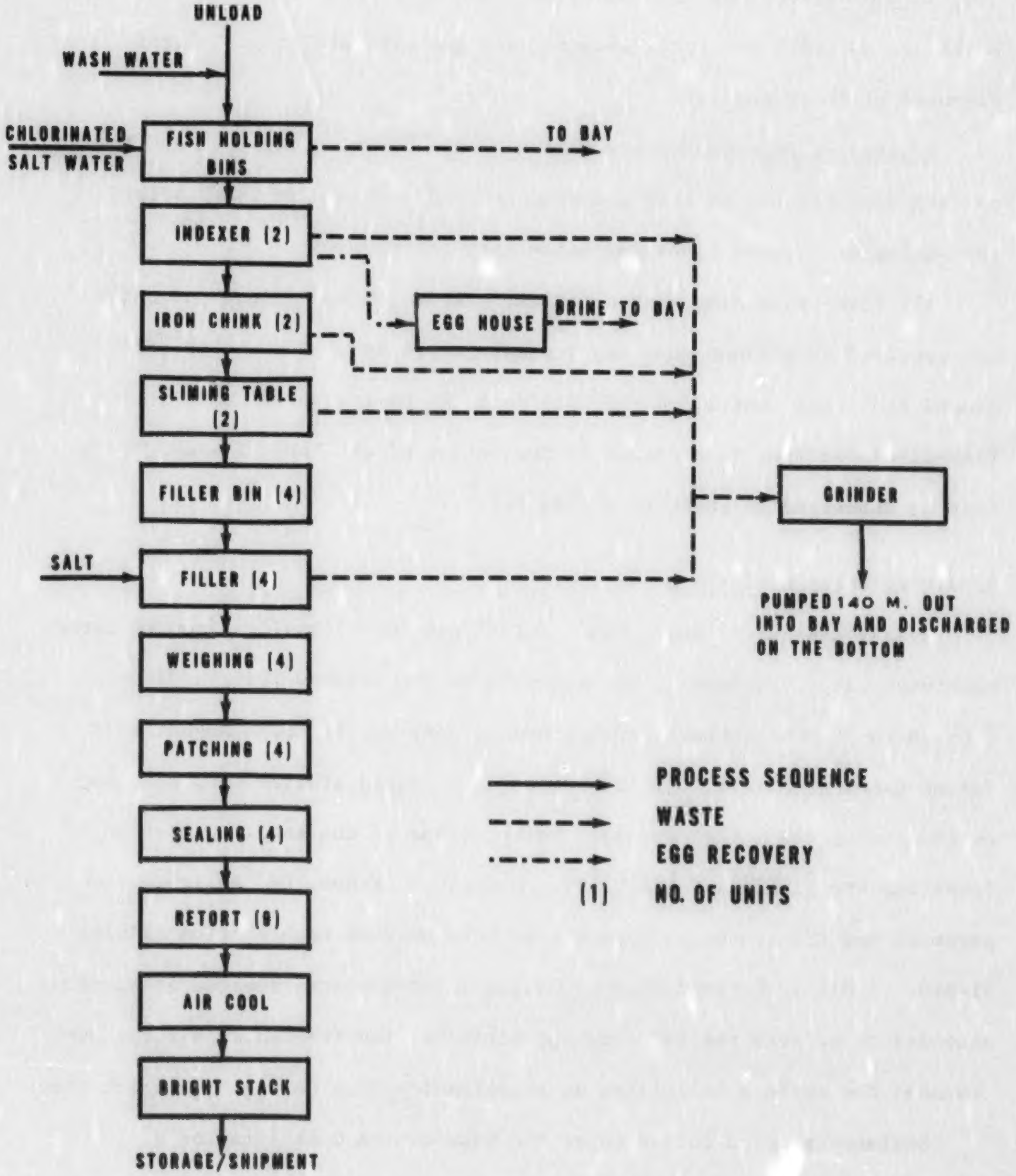
UNLOAD
WASH WATER
CHLORINATED SALT WATER
FISH HOLDING BINS
TO BAY
INDEXER (2)
IRON CHINK (2)
EGG HOUSE
BRINE TO BAY
SLIMING TABLE (2)
FILLER BIN (4)
GRINDER
SALT
FILLER (4)
PUMPED 140 M. OUT INTO BAY AND DISCHARGED ON THE BOTTOM
WEIGHING (4)
PATCHING (4)
SEALING (4)
RETORT (9)
AIR COOL
BRIGHT STACK
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(1) NO. OF UNITS

Figure VI-D7. Salmon Canning Sequence, New England Fish Co., Chatham, Alaska

Refuse--All combustible materials such as paper, boards and cardboard are burned. Materials such as cans and wire are compacted and disposed of in a landfill.

Process Wastes--Wastes are generated at the unloading dock and in canning operations. As fish are unloaded and washed with fresh water, the washwater carries blood and slime into the bay.

All fish processing wastes (heads, viscera, blood, fins, and tails) are conveyed to a flume that empties into a grinder. The wastes are ground and pumped out 135 m (450 ft) into the bay. The 10 cm (4 in.) flex-discharge line is anchored to the bottom of the bay. The end of the line is submerged in about 60 m (200 ft).

Receiving Water Evaluation

Hydrographic, sediment, and chemical data were obtained from selected receiving water stations in the vicinity of the cannery [Figure VI-D8] from 26 to 28 June (before canning operations) and 16 to 18 August 1973 (after canning operations). Biological and Vibrio studies were also conducted during the latter period. Descriptions of the sampling station locations are given in Table VI-D9. Dissolved oxygen, pH, salinity, temperature and transparency measurements were made at each station [Tables VI-D10, VI-D11]. No significant changes in parameters occurred at sampling stations or between the two sampling periods. Two freshwater streams influenced the surface salinities at selected stations during high slack tide.

Sediment samples collected at the face of the dock [Station B, Figure VI-D8] prior to the canning season had organic carbon and nitrogen

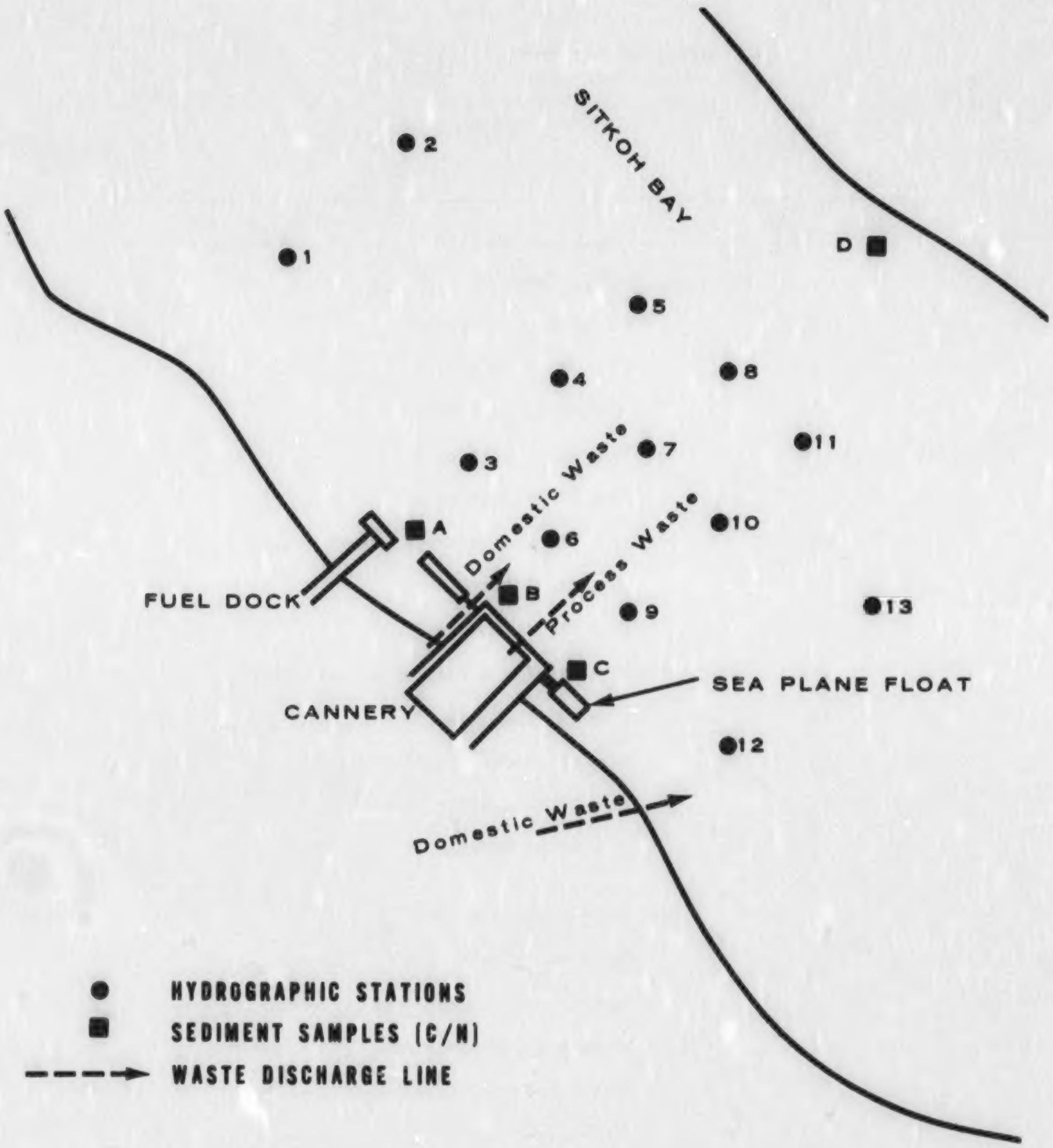
SITKOH BAY
2
1
D
5
4
8
3
Domestic Waste
7
11
A
6
Process Waste
10
B
FUEL DOCK
9
13
C
SEA PLANE FLOAT
CANNERY
12
Domestic Waste
● HYDROGRAPHIC STATIONS
■ SEDIMENT SAMPLES (C/N)
WASTE DISCHARGE LINE

Figure VI-D8. New England Fish Company , Chatham, Alaska Hydrographic / Sediment Station Locations

TABLE VI-D9

DESCRIPTION OF WATER QUALITY, VIBRIO AND SEDIMENT SAMPLING STATIONS NEW ENGLAND FISH COMPANY CHATHAM, ALASKA

Map Key[a]	Description
	Water Quality Sampling Stations
1	150 m NW of fuel dock
2	75 m NE of Station 1
3	50 m NE of fuel dock
4	75 m NE of Station 3
5	75 m NE of Station 4
6	50 m NE of W corner of cannery dock
7	75 m NE of Station 6
8	75 m NE of Station 7
9	50 m NE of E corner of cannery dock
10	75 m NE of Station 9
11	75 m NE of Station 10
12	75 m E of seaplane dock
13	75 m NE of Station 12
	Vibrio Sampling Stations
A	500 m NW of fuel dock
B	Inside main cannery dock
C	Inshore of seaplane dock
D	Adjacent to public dock
F	At seaplane dock
	Sediment Sampling Stations
A	Adjacent to fuel dock
B	NW corner of cannery dock
C	At seaplane dock
D	NE of cannery on opposite shore (control)

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[a] Station locations are shown in Figures VI-D6 and VI-D8.

TABLE VI-D10

SUMMARY OF WATER QUALITY
CHATHAM, ALASKA
(26 to 28 JUNE 1973)

Parameter	Sta. No.[a]	Range of Values			
		High Water		Low Water	
		Surface	Bottom	Surface	Bottom
DO, mg/l	1	10.7	9.7	11.6	10.3
	2	—	—	—	—
	3	10.8	9.7	11.0	9.4
	4	10.8	9.7	10.7	11.1
	5	—	—	—	—
	6	10.8	9.9	10.8	10.1
	7	10.8	9.8	10.7	9.6
	8	—	—	—	—
	9	10.9	9.9	11.0	9.8
	10	10.6	9.7	11.0	9.7
	11	—	—	—	—
	12	10.9	10.2	11.2	9.8
Temperature °C	1	11.5-11.5	7.0-9.0	10.5-12.0	9.5-10.0
	2	9.5-10.0	7.5-8.5	11.0-11.5	8.0-8.5
	3	8.5-10.5	7.0-8.5	10.5-11.0	8.0-8.5
	4	8.0-10.0	7.0-8.0	10.5-10.5	8.0-9.0
	5	9.5-11.0	7.0-8.0	11.0-11.0	7.5-8.0
	6	9.5-10.0	7.5-8.5	10.0-11.0	8.0-9.0
	7	8.5-10.0	7.0-8.5	11.0-11.0	7.5-7.5
	8	9.5-10.5	7.0-8.5	11.0-11.0	7.5-8.0
	9	9.0-10.0	7.0-8.5	10.5-11.0	7.5-8.5
	10	9.0-10.5	7.5-8.0	11.0-11.0	7.0-8.0
	11	9.5-10.5	7.0-8.5	10.5-11.0	7.5-8.0
	12	9.5-10.5	6.5-8.5	10.5-10.5	7.5-8.5
	13	9.5-10.0	7.0-8.5	10.5-11.0	7.5-8.0

Parameter	Sta. No.[a]	Range of Values			
		High Water		Low Water	
		Surface	Bottom	Surface	Bottom
Salinity, ppt	1	4.5-5.0	21.0-23.0	22.0	24.5-24.5
	2	6.0-10.5	21.0-23.0	18.5-21.0	22.5-22.5
	3	7.5-8.5	21.0-23.0	20.5-21.0	22.5-22.5
	4	3.0-5.5	20.5-22.5	18.0-19.5	22.5-23.5
	5	4.0-13.5	22.5-22.5	19.0-21.2	20.0-22.5
	6	7.0-13.5	21.5-23.0	18.0-21.0	22.0-23.0
	7	4.0-7.5	21.0-23.0	16.0-22.0	21.8-22.0
	8	6.5-14.5	21.0-22.5	15.0-22.0	22.0-22.5
	9	12.0-12.5	21.0-22.5	16.0-21.2	22.0-22.2
	10	5.5-8.0	21.2-22.5	15.5-22.0	21.0-22.5
	11	10.5-13.5	21.0-23.0	15.0-23.0	22.0-22.5
	12	5.5-12.8	20.8-22.5	15.0-21.2	21.5-23.0
	13	4.0-11.0	21.0-22.5	16.0-22.5	22.0-22.5
pH	All Stations - 8.5				
Transparency		6.0 to 6.5 m			

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[a] See Table VI-09 for station descriptions.

TABLE VI-D11

SUMMARY OF WATER QUALITY
CHATHAM, ALASKA
(16 to 18 AUGUST 1973)

Parameter	Station No.[a]	Range of Values			
		High Water		Low Water	
		Surface	Bottom	Surface	Bottom
DO, mg/l	1	9.8	9.0	9.8-9.9	9.2-9.7
	2	—	—	—	—
	3	9.6	9.6	9.7-9.8	9.0-9.4
	4	9.8	9.1	9.8-9.8	9.3-9.7
	5	—	—	—	—
	6	9.6	9.1	9.8-9.8	9.0-9.4
	7	9.7	9.0	9.7-9.9	9.2-9.5
	8	—	—	—	—
	9	9.7	8.9	9.7-9.8	8.1-9.5
	10	9.8	9.1	9.6-9.8	9.5-9.9
	11	—	—	—	—
	12	9.8	8.6	9.7-9.8	9.2-9.7
Temperature, °C	1	12.0-12.0	9.0-10.0	10.5-11.0	9.5-10.0
	2	11.0-11.5	9.0-10.5	10.0-11.0	9.0-9.5
	3	11.0-12.0	9.5-11.5	9.0-10.0	9.0-9.5
	4	10.5-11.0	9.0-10.0	9.5-10.5	9.0-9.5
	5	10.5-11.0	9.0-10.0	9.5-10.5	9.0-9.5
	6	11.0-12.0	9.0-10.0	9.5-10.5	9.0-9.5
	7	11.0-11.5	9.0-10.0	9.5-10.0	9.0-10.0
	8	10.5-11.0	9.0-10.5	9.5-11.0	9.0-9.5
	9	10.5-11.5	9.0-10.5	9.5-10.5	9.0-9.5
	10	10.5-11.5	9.0-10.0	10.0-10.5	9.0-10.5
	11	10.5-11.0	9.0-10.0	9.5-10.0	9.5-10.0
	12	11.0-12.0	9.0-10.0	9.5-10.0	9.0-10.0
	13	11.0-11.5	9.0-10.0	10.0-10.0	9.0-9.5
Salinity, ppt	1	22.0-25.0	23.0-23.5	16.5-17.5	20.0-22.5
	2	21.5-24.5	22.0-24.0	10.0-17.5	22.0-23.0
	3	19.0-24.5	21.5-23.0	15.0-18.0	22.5-23.0
	4	19.0-23.0	22.5-23.5	16.5-21.0	22.0-23.0
	5	22.0-24.0	22.5-23.0	11.0-20.5	22.5-23.0
	6	19.5-24.0	22.0-23.0	17.5-23.0	23.0-23.5
	7	20.5-23.5	23.0-23.0	16.0-19.5	22.5-23.5
	8	20.0-23.0	22.5-24.0	7.0-21.5	22.5-23.5
	9	20.5-23.0	22.5-24.0	17.0-19.0	22.5-23.0
	10	21.0-22.5	22.5-23.0	12.0-22.0	20.5-23.0
	11	21.0-22.5	23.0-23.0	16.5-21.5	22.5-23.0
	12	21.0-23.5	22.5-23.0	14.0-19.8	23.0-23.5
	13	21.0-23.5	22.5-23.0	13.0-22.0	22.0-23.0
pH	All stations - 8.5				
Transparency		4 to 5 m			

---

[a] See Table VI-D9 for station descriptions.

contents of 7.0 and 1.68 percent, respectively (OSI 11.80), indicating an actively decaying material [Table VI-D12]. The other stations had OSI values ranging from 1.56 to 2.45 which also indicate decaying material. During the survey period following the canning season, the sediment samples were organically stable at all but one station which had OSI values of less than 0.50. Station A had an OSI value of 4.18. The sediment data reflects the influence of organic sources other than the cannery on the bay. The decrease in OSI at all but one station (Station A) indicates adequate dispersal of fish wastes by tidal action.

Bacteriological data show that the area around the public dock was highly contaminated (fecal-coliform log mean of 9,000/100 ml [Table VI-D13]. The source of this contamination is probably from boats discharging raw sewage in the area.

Vibrio* was isolated in sediment samples in the area of the cannery with densities varying from 91 to 430/100 g. Vibrio was not isolated in any water samples. Vibrio isolations at these densities are not a hazard to marine species in the area.

Treatment Needs

Based on field observations, water quality studies, and the disposal technique currently used for domestic and process wastes, the treatment being employed is generally adequate. Some fish heads are discharged from the cannery without being ground. The source of these unground heads should be located and eliminated.

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* For a discussion on Vibrio see Appendix D.

TABLE VI-D12

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS
CHATHAM, ALASKA

Station[a]	Depth (meters)	Organic N (percent)		Organic C (percent)		OSI		Bottom Type
		June	Aug.	June	Aug.	June	Aug.	
A	21.0	0.52	0.89	3.0	4.7	1.56	4.18	Sand, Gravel, Organic Mud, Oil
B	12.0	1.68	0.01	7.0	0.7	11.80	0.01	Sand, Gravel, Organic Mud, Cans
C	12.0	0.60	0.15	3.4	1.3	2.04	0.20	Sand, Gravel, Organic Mud
D	15.0	0.98	0.16	2.5	0.8	2.45	0.13	Sand, Gravel, Shell

[a] See Table VI-D9 for station descriptions.

TABLE VI-D13

SUMMARY OF BACTERIOLOGICAL RESULTS
NEW ENGLAND FISH COMPANY
CHATHAM, ALASKA
16 TO 17 AUGUST 1973

		Coliforms MPN/100 ml					
		Total Coliforms			Fecal Coliforms		
Map Key[a/]	Station Description	Minimum	Maximum	Logarithmic Mean	Minimum	Maximum	Logarithmic Mean[b/]
G	Background station, 200 m S of WWTP discharge	330	1,700	750	23	80	43
A	500 m NW of fuel dock	1,300	1,700	1,500	490	700	590
B	Inside main cannery dock	4,900	35,000	13,000	230	940	460
C	Inshore of seaplane dock	2,300	13,000	5,500	41	170	83
D	Adjacent to public dock	24,000	>240,000	>76,000	2,300	35,000	9,000
F	At seaplane dock	490	79,000	6,200	79	1,100	290

		Vibrio MPN/100 ml or g			
		Sample Type	Date	Isolate	Density
G	Background station, 500 m N of gasoline dock	Sediment	16 Aug 73	No *Vibrio* Isolated	—
		Water	16 Aug 73	No *Vibrio* Isolated	—
B	Inside main cannery dock	Sediment	16 Aug 73	*V. alginolyticus*	430/100 g
			17 Aug 73	*V. alginolyticus*	91/100 g
		Water	16 Aug 73	No *Vibrio* Isolated	—
			17 Aug 73	No *Vibrio* Isolated	—
C	Inshore of seaplane dock	Sediment	16 Aug 73	*V. alginolyticus*	91/100 g
			17 Aug 73	No *Vibrio* Isolated	—
		Water	16 Aug 73	No *Vibrio* Isolated	—
			17 Aug 73	No *Vibrio* Isolated	—

a/ Station locations are shown in Figure VI-D6.
b/ Log mean of two samples.

D-6. NEW ENGLAND FISH COMPANY, KETCHIKAN, ALASKA

General

The New England Fish Company owns and operates a cold storage facility south of Ketchikan, Alaska [Figure IV-3]. The plant, located on the Tongass Narrows, processes halibut and salmon from March through September. Company officials estimated that about 68 kkg (150,000 lb) of halibut and 635 kkg (1,400,000 lb) of salmon would be processed during the 1973 season.

The plant employs about 14 people. Fish are processed five days per week, 8 hr/day. Average production of salmon is about 68 kkg (15,000 lb)/day with a maximum plant capacity of 454 kkg (100,000 lb)/day.

A U.S. Army Corps of Engineers Refuse Act Permit Program (RAPP) application for this plant was filed 18 June 1971. EPA personnel from National Field Investigations Center-Denver and Region X, Seattle visited the plant on 10 August 1973. Mike Cusack, plant manager, provided information and assistance.

Water Supply

All industrial and domestic waters are obtained from Ketchikan. The total water supply is chlorinated before use. Process water includes that used for washing, cleaning, and glazing operations as well as cleanup of the plant. Company personnel did not know the volume of water used.

Process Operations

Salmon and halibut are off-loaded from fishing boats, hand butchered, cleaned, frozen and shipped. Salmon heads are ground and used for pet food; eggs are recovered for processing elsewhere.

Waste Sources

Domestic Wastes--The domestic wastewaters are discharged to the Tongass Narrows without treatment. These wastes are to be connected to the municipal sewer as soon as Ketchikan has a wastewater treatment facility in operation.

Refuse--Waste materials such as paper and boxes are collected and disposed of by company employees at the city dump. No estimate of the volume generated was available.

Process Wastes--Wastes are generated at the unloading dock from washing fish. Halibut heads and salmon heads (when they are not recovered for pet food) are ground and discharged to the bay. Blood, fish parts, and viscera are discharged to the bay through a hole in the plant floor.

Treatment Needs

Process wastes should be collected, screened to recover the solid material, and the liquid portion passing through the screen should be discharged below low low tide to insure dispersion and to prevent the occurrence of floating solids.

D-7 NEW ENGLAND FISH COMPANY - FIDALGO PACKING COMPANY, KETCHIKAN, ALASKA

General

The New England Fish Company and The Whitney-Fidalgo Seafoods, Inc. jointly operate a salmon cannery in Ketchikan, Alaska [Figure VI-3]. Built in 1965, the cannery receives and processes salmon from fishing boats that are under contract either with New England Fish Company or Whitney-Fidalgo. The finished product is divided according to percentage of fish delivered to the cannery by each company.

The cannery employs a maximum of 165 people and has been operating 12 to 18 hr/day, 5 days/week from July to September. Average production and plant capacity was given as 5,000 cases/day. Plant production records* for 1970 and 1972 showed that 169,000 and 134,000 cases, respectively, were produced. The cannery production for 1973 was estimated to be between 100,000 and 150,000 cases.

An Army Corps of Engineers Refuse Act Permit Program (RAPP) application for this plant was filed 24 June 1971. EPA personnel from National Field Investigations Center-Denver and Region X, Seattle, visited the plant on 10 August 1973. John Lynn, manager (Fidalgo) and Don Franett (New England) provided information and assistance.

Water Supply

All industrial and domestic water is obtained from Ketchikan. The total water supply is chlorinated at a rate that maintains a 3 to 5 ppm residual. Company officials could not provide an estimate of the volume of water used.

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* The plant did not operate in 1971.

Saltwater from the bay is used for chilled storage of fish: HTH is added to the saltwater.

Process Operations

Salmon are off-loaded, sorted by species into either chilled brine tanks or to bins for immediate processing. Salmon processing occurs in a manner similar to that described in Section V [Figure V-1]. A processing and waste source schematic is shown in Figure VI-D9. The cannery uses two tall lines (15 1/2-oz canning lines).

Fish heads are recovered, ground sacked, frozen, and used for pet food. Company officials stated that about 14 percent of the live weight of fish processed are recovered in this manner.

Waste Sources

Domestic Wastes--All domestic wastes are collected and discharged about 15 m (50 ft) into the bay. The water surface is about 14 m (45 ft) above the end of the line at the point of discharge.

Refuse--All refuse wastes are collected and hauled to the city dump.

Process Wastes--Wastes are generated at the unloading dock and during the canning process. As fish are unloaded into the mechanical conveyor, blood and slime wastes drain into the bay. Process wastes (viscera, blood, fins, tails) are collected and flumed to a holding tank.

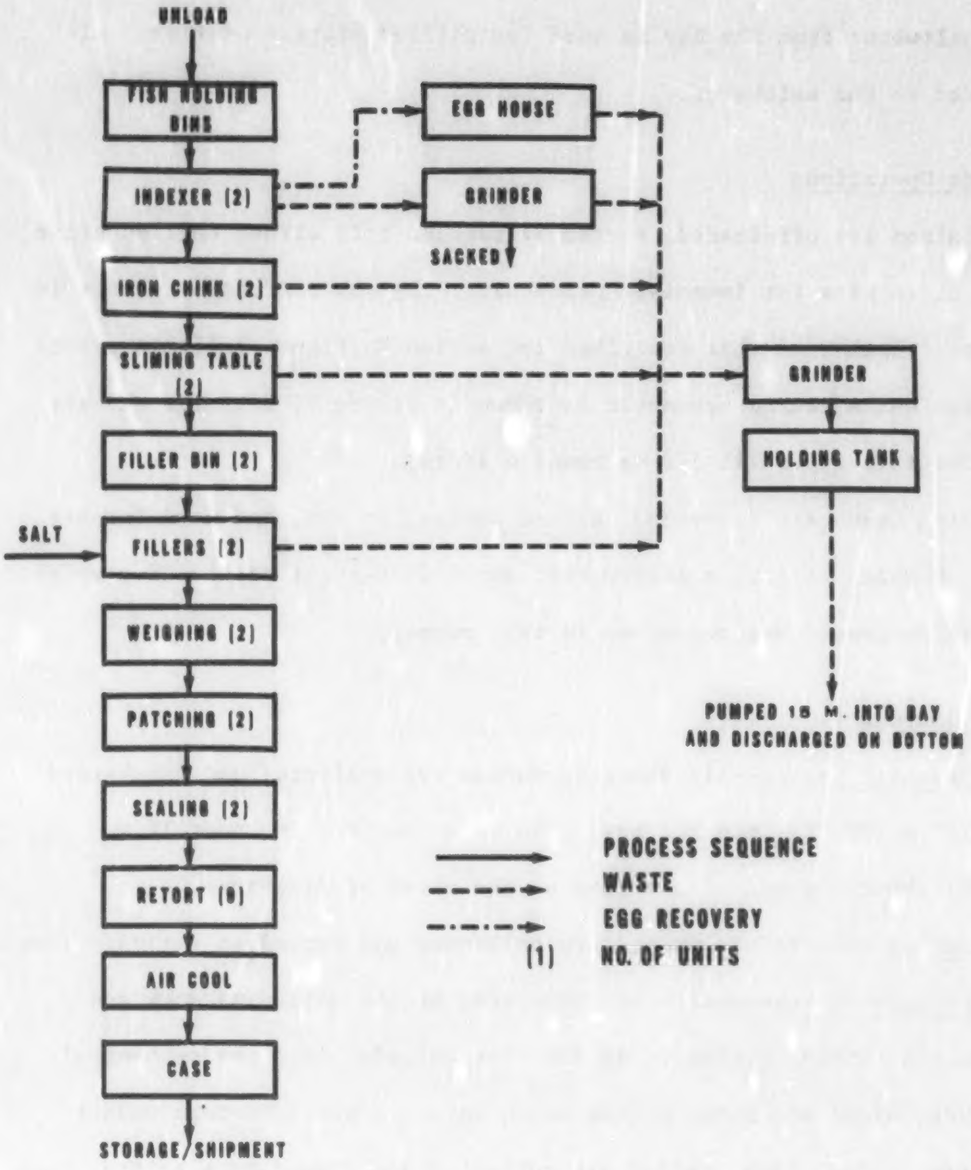
UNLOAD
FISH HOLDING BINS
INDEXER (2)
IRON CHINK (2)
SLIMING TABLE (2)
FILLER BIN (2)
SALT
FILLERS (2)
WEIGHING (2)
PATCHING (2)
SEALING (2)
RETORT (8)
AIR COOL
CASE
STORAGE/SHIPMENT
EGG HOUSE
GRINDER
SACKED
GRINDER
HOLDING TANK
PUMPED 15 M. INTO BAY AND DISCHARGED ON BOTTOM
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(1) NO. OF UNITS

Figure VI-D9. Salmon Canning Sequence, New England Fish-Fidalgo Packing Co., Ketchikan, Alaska

The tank is emptied periodically by pumping the waste (this reduces the size of the solids) out to a point about 18 m (60 ft) into the bay. The discharge point is on the bottom of the bay, under water about 14 m (45 ft).

Treatment Needs

Based on observations made during the in-plant visit, the present process waste treatment system and practices are adequate; however, the company should investigate the feasibility of solids recovery. Domestic wastewaters should be discharged to a municipal sewer system.

D-8 PETERSBURG FISHERIES, INC., PETERSBURG, ALASKA

General

The Petersburg Fisheries, Inc. operates a salmon cannery and cold storage facility [Figure VI-3], in Petersburg, Alaska. The cannery was constructed in 1897 and is the oldest canning facility in Alaska. The plant layout of the processing area is shown in Figure VI-D10. The cannery employs 150 to 200 people during peak season and 30 to 50 during the winter months. The cannery operates 5 to 6 days per week, 16 to 18 hr/day. The normal operating season for the plant extends from June through October. This year the season ran from July through September. The cannery processes about 60 percent pink and 20 percent each of chum and red salmon; herring and crab are also processed at this facility. Plant production capacity is 100,000 fish or 318 kkg (350 tons) per day*. Average cannery production for 1973 ranged between 1,200 to 2,000 cases per day. The cannery production for recent years is tabulated below:

Year	Annual Production (cases)
1973	100,000 (est.)
1972	123,000
1971	40,000
1970	84,000
1969	17,000
1968	123,000
1967	37,000

The cold storage facility, formally Petersburg Cold Storage, operates year around and employs about 50 people. This facility processes fish seven days a week from June through October and five days a week

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* This includes production from cold storage facility which is approximately 109 kkg (120 tons)/day.

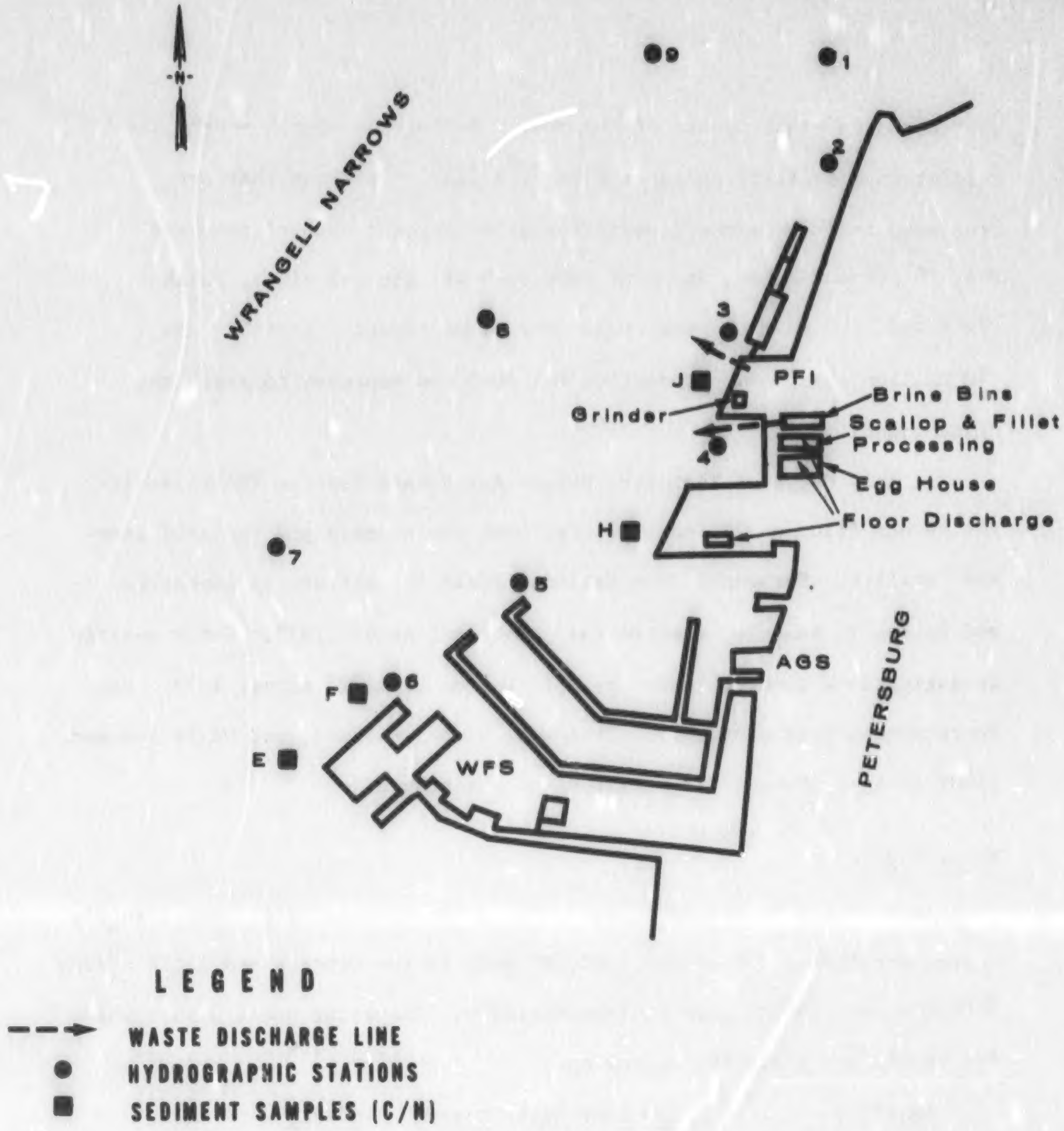
N
WRANGELL NARROWS
9
1
2
3
8
J
PFI
Grinder
Brine Bins
Scallop & Fillet Processing
Egg House
Floor Discharge
4
H
7
5
AGS
PETERSBURG
F
6
E
WFS
LEGEND
WASTE DISCHARGE LINE
HYDROGRAPHIC STATIONS
SEDIMENT SAMPLES (C/N)

Figure VI-D10. Petersburg Fisheries, Inc.,(PFI), Whitney-Fidalgo Seafoods, Inc.,(WFS), Alaska Glacier Seafood Co.,(AGS), Petersburg, Alaska Plant Layout - Station Locations

the remaining eight months of the year. During the summer months the cold storage facility operates 8 to 12 hr/day. Seafoods that are processed include salmon (consisting of 40 percent each of chum and red, 10 percent cohos, and 5 percent each of king and pink), halibut, black cod, red snapper, and crab. The plant capacity is 4,535 kkg (10 million lb)/year. Production for 1973 was expected to reach the plant capacity.

An Army Corps of Engineers Refuse Act Permit Program (RAPP) application was filed on 29 June 1971 for both the cannery and the cold storage facility. Personnel from National Field Investigations Center-Denver and Region X, Seattle, visited the plant on 1 August 1973. Water quality investigations were conducted by NFIC-D from 21 to 25 August 1973. Bob Thorstenson, president, T. E. Thompson, vice president, and Wally Swanson, plant manager provided information and assistance.

Water Supply

As reported in the RAPP application, the city municipal water supply system provides 2,080 m^3/day (550,000 gpd) to the cannery and 2,270 m^3/day (600,000 gpd) to the cold storage facility. The water usage within the two plants was estimated as follows:

Facility	In-plant Water Usage	m^3/day	mgd
Cannery	cooling water	227	0.06
	boiler feed water	19	0.005
	sanitary system	9.5	0.0025
	other	1,830	0.4830
Cold Storage	cooling water	945	0.25
	sanitary system	1,315	0.347
	other	9.5	0.0025

In addition, saltwater is used in fish storage bins to flume fish eggs from the indexer to the egg house, and flume the fish from boats to mechanical conveyors. Water used for all other processing is obtained from Petersburg. No chemical or bacteriological analyses of the water supply are made. In-plant chlorination of all water that is used is provided.

Process Operations

Salmon are off-loaded from tenders or fishing boats into a mechanical elevator. Fish are sorted by species and grades with the choice grades processed (butchered, frozen, and shipped) in the cold storage facility. The remaining fish are processed at the cannery in a manner similar to that discussed in Section V. The cannery has five filler lines: 1/4 lb, 1/2 lb, two 1 lb, and 4 lb can sizes. Any two lines can be run at the same time. Eggs are recovered and processed from both the cannery and cold storage operation. Heads are used for fish bait or ground and made into pet food.

Future plant expansions are planned to increase the crab line capacity and construct a waste reduction plant for recovery of oil and solids from fish waste materials. Crab are processed as outlined in Section V.

WASTE SOURCES

Domestic Wastes--Domestic wastes originating from the cannery and cold storage facility are being discharged into the city sewer system. Petersburg discharges all domestic wastes into the bay without treatment.

Refuse--Refuse wastes generated consist of paper and cans, which are hauled to the city dump for disposal.

Process Wastes--The process wastes constitute 25 to 30 percent of the incoming weight of the salmon. Wastes are generated at the unloading dock, fish house and cannery. During unloading from the tenders or fishing boats, a small amount of blood and slime reach the bay as drainage from the fish conveyor and as pumpage from the fish holds. In the fish house, wastes from the iron chink (tails, fins, and viscera), sliming table, and floor drains are collected in a central flume and pumped out into the bay, a distance of 30 m (100 ft) from the dock face. Crab shells are discharged into the bay at the face of the dock.

In the cold storage facility all butchering wastes (tails, fins, and viscera) are dropped through floor drains directly into the bay area beneath the plant. Floating solids and foam observed around the dock area were believed to originate from the cold storage operation.

Petersburg Fisheries, Inc. is building a waste reduction plant. Upon completion of this plant, all process waste solids will be rendered.

Receiving Water Evaluation

Hydrographic, sediment and chemical data were obtained from selected receiving water stations [Table VI-D14] in the vicinity of the processing operations (Petersburg Fisheries, Inc., Whitney-Fidalgo Seafoods, Inc. and Alaska Glacier Seafoods Co.). Samples were collected both at high and low tides at the surface and near the bottom. Measurements for dissolved oxygen, pH, salinity, temperature and transparency were made at each station

TABLE VI-D14

DESCRIPTION OF WATER QUALITY AND SEDIMENT SAMPLING STATIONS PETERSBURG, ALASKA

Map Key[a]	Description
	Water Quality Sampling Stations
1	At buoy No. 60
2	75 m S buoy No. 60
3	10 m N of N corner of Petersburg Fisheries, Inc. dock
4	Inside between Petersburg Fisheries, Inc. docks
5	Off Blue Star cruise dock
6	N corner of Whitney-Fidalgo Seafoods, Inc. dock
7	Between buoy No. 49 and Whitney-Fidalgo Seafoods, Inc. dock
8	100 m NW of Petersburg Fisheries, Inc. dock
9	75 m W of buoy No. 60
	Sediment Sampling Stations
E	W corner of Whitney-Fidalgo Seafoods, Inc. dock
F	Midway off Whitney-Fidalgo Seafoods, Inc. dock
H	W corner of Petersburg Fisheries, Inc. dock
J	10 m W of Petersburg Fisheries, Inc. dock

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[a] Station locations are shown in Figure VI-D10.

TABLE VI-D15

SUMMARY OF WATER QUALITY
PETERSBURG, ALASKA

Parameter	Station No.[a]	Range of Values			
		High Water		Low Water	
		Surface	Bottom	Surface	Bottom
DO, mg/l	1	11.3	9.6	10.0-10.3	9.8-10.3
	2	9.3-9.4	9.2-9.3	9.8-10.4	9.3-10.2
	3	9.5-10.0	9.1-9.5	10.2-10.3	9.8-10.4
	4	9.3-10.3	9.4-10.0	9.8-10.6	9.6-10.4
	5	9.3-10.3	9.4-10.0	10.1-10.3	9.6-10.4
	6	9.3-10.4	9.3-10.0	9.8-10.4	9.6-10.2
	7	9.6-10.5	9.2-9.8	10.1-10.4	9.6-10.0
	8	9.3-10.5	9.1-10.3	9.7-10.5	9.5-10.0
	9	10.0-10.1	9.7-10.0	10.2-10.6	9.5-10.4
Temperature °C	1	8.5-10.5	7.5-9.0	9.3-10.0	8.5-9.5
	2	8.0-9.0	7.7-9.0	9.0-9.5	8.5-9.5
	3	8.0-9.0	7.7-8.5	9.4-9.5	8.7-9.5
	4	8.0-9.0	7.7-9.0	9.0-9.5	9.0-9.5
	5	8.5-9.5	7.7-9.0	9.5	8.7-9.5
	6	8.0-9.0	7.5-9.0	8.0-10.0	9.0-9.5
	7	7.5-10.0	7.5-9.0	9.4-9.5	9.0-9.5
	8	7.5-10.0	7.7-10.0	9.3-9.5	8.3-9.5
	9	7.5-10.5	7.3-9.0	9.0-9.5	8.3-9.5
Salinity, ppt	1	19.0-20.5	19.5-20.5	19.1-20.4	19.0-21.0
	2	18.5-20.0	19.0-21.0	18.5-20.0	19.0-20.5
	3	19.0-20.0	19.0-20.5	18.8-20.0	19.0-19.7
	4	18.5-20.0	19.0-20.5	18.5-19.7	19.0-19.7
	5	18.5-20.0	18.5-21.0	18.5-19.7	18.7-20.0
	6	18.5-20.0	18.5-21.0	18.4-20.4	18.5-20.0
	7	18.0-20.0	19.0-21.0	18.4-19.7	19.0-20.0
	8	18.0-20.0	18.5-21.0	19.3-20.0	19.0-20.0
	9	18.4-19.5	19.0-20.5	18.4-20.0	19.3-20.5
pH	1-8	8.5			
	9	8.5-9.0			
Transparency		4 m			

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[a] See Table VI-D14 for station descriptions.

[Table VI-D15]. No significant differences were noted in these parameters.

Sediment samples collected at selected stations showed a stable mud, sand material; OSI values ranged from 0.03 to 0.39 [Table VI-D16]. The lack of fish waste deposits indicate the wastes are being adequately dispersed in Wrangell Narrow.

None of the processors operated consistently during the study period 21 to 25 August 1973.

TABLE VI-D16

CHEMICAL CHARACTERIZATION OF BOTTOM SEDIMENTS
PETERSBURG, ALASKA

Station[a/]	Depth (meters)	Organic N (percent)	Organic C (percent)	OSI	Bottom Type
E	10.6	0.02	2.3	0.05	Mud, Sand
F	9.0	0.15	2.6	0.39	Mud
H	9.0	0.01	2.5	0.03	Mud, Sand
J	9.0	0.05	0.6	0.03	Mud, Sand

a/ Station descriptions are given in Table VI-D14.

Treatment Needs

All process wastes from the cannery, egg house, fillet house, and cold storage wastes should be screened to recover the solid material, and the liquid passing through the screen should be discharged to the bay below low low tide.

D-9 PETERSBURG PROCESSORS, INC., PETERSBURG, ALASKA

General

The Petersburg Processors, Inc., a salmon cannery at Petersburg, Alaska, is on Mitkof Island [Figure VI-3]. The cannery was constructed in 1957 and employs about 40 people.

The cannery generally operates from the first of July to the middle of September. During the 1973 season the plant processed 3 days/week 10 hr/day. The average annual production from 1957 to 1973 was 25,000 cases. Average annual production for 1973 was estimated to be 20,000 cases (700 cases/day). The plant capacity is 50,000 cases/year. Since 1970, the annual production has been controlled by the availability of salmon and fishing restrictions imposed by regulatory agencies. Recent salmon production history is tabulated below.

Year	Annual Production (cases)
1973	20,000 (est.)
1972	25,100
1971	Not in operation
1970	25,000

A U.S. Army Corps of Engineers Refuse Act Permit Program (RAPP) application for this plant was filed 25 June 1971. EPA personnel from National Field Investigations Center-Denver and Region X visited the plant on 3 August 1973. Ray Wood, plant supervisor, provided information and assistance.

Water Supply

Petersburg supplies water for both processing and domestic uses.

In addition, saltwater is used to flume fish from the tenders to the unloading elevators, from the brine tanks to the processing area, and fish eggs from the indexer to the egg house. Both freshwater and saltwater are chlorinated. Approximately 136 kg (300 lb) of gas chlorine are used each season.

Company officials estimated a maximum freshwater and saltwater use rate of 680 m^3/day (180,000 gpd). This estimate is similar to that in the RAPP application which reports total use of 590 m^3/day (156,000 gpd), including 182 m^3/day (48,000 gpd) of saltwater and 408 m^3/day (108,000 gpd) of freshwater. Freshwater is used as follows: 73 m^3/day (19,200 gpd) for cooling water, 18 m^3/day (4,800 gpd) for boiler feed water, 300 m^3/day (79,200 gpd) for process water, 18 m^3/day (4,800 gpd) for domestic water and 180 m^3/day (48,000 gpd) for unspecified usage.

Process Operations

During periods of maximum production, the cannery operates about 10 seine and 20 gill net boats 5 and 2, respectively, were in operation at the time of the survey). Fish are off-loaded from the boats and taken by mechanical elevator to the storage bins until time for processing. Salmon are processed in a manner similar to that described in Section V. The specific processing sequence for this cannery is depicted in Figure VI-D11. Oil from fish heads is not recovered, but eggs are a byproduct. The cannery has two filler lines: one 1 lb, and one 4 lb can size. Only one line operates at a time. Salmon are canned at the rate of 130 and 80 cans/hr for the 1 and 4 lb lines, respectively. The latter are packed manually.

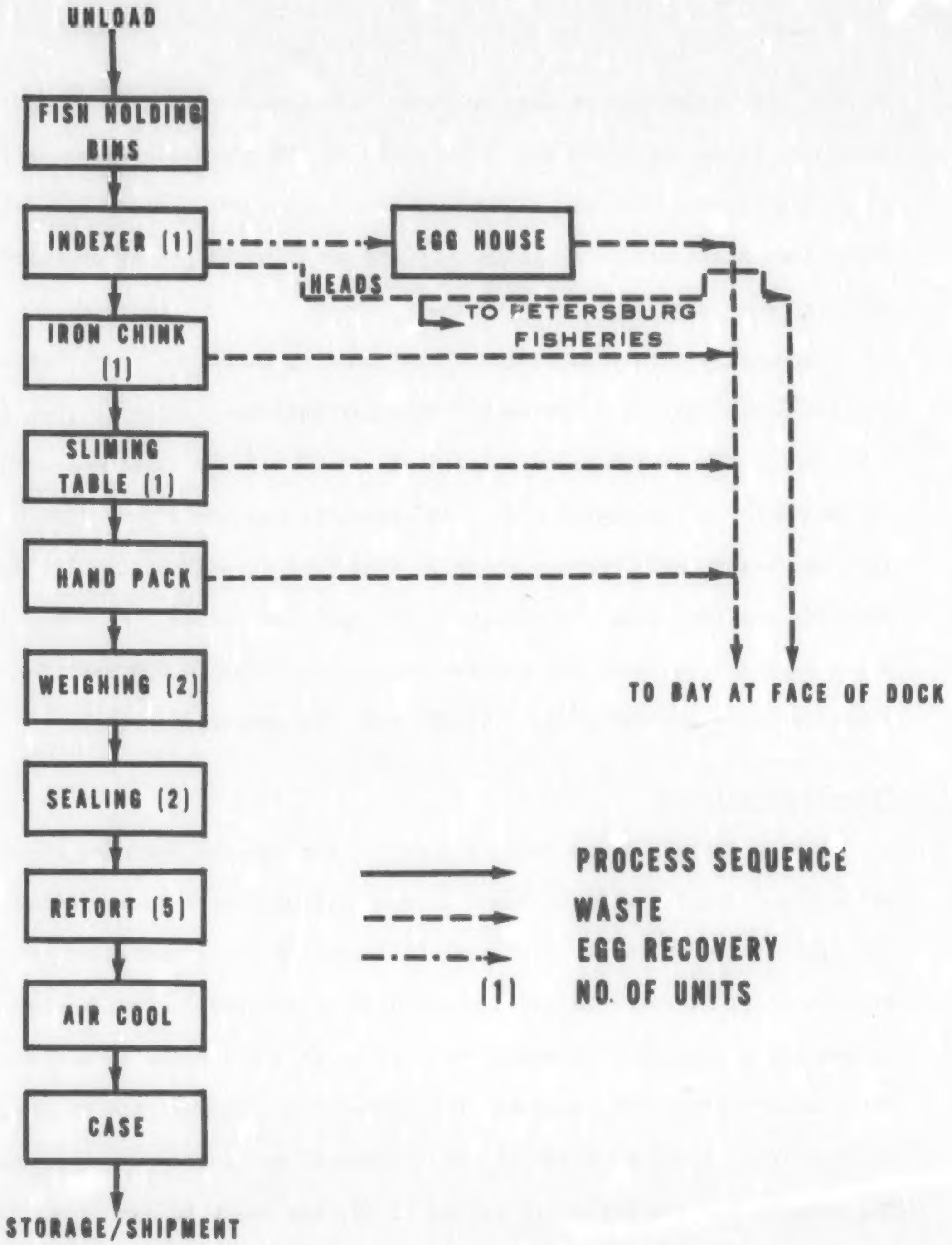
UNLOAD
FISH HOLDING BINS
INDEXER (1)
EGG HOUSE
HEADS
TO PETERSBURG FISHERIES
IRON CHINK (1)
SLIMING TABLE (1)
HAND PACK
WEIGHING (2)
SEALING (2)
RETORT (5)
AIR COOL
CASE
STORAGE/SHIPMENT
TO BAY AT FACE OF DOCK
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(1) NO. OF UNITS

Figure VI-D11. Salmon Canning Sequence

Petersburg Processors, Inc., Petersburg, Alaska

WASTE SOURCES

Domestic Wastes--These wastes are collected and discharged without treatment into the estuary. The cannery plans to connect the domestic wastes to the city sewer before the end of September, 1973.

Refuse--Wastes including boxes, cans, and waste paper are collected and sent to the city dump. The beaches in the area of the cannery appeared relatively free of trash and debris.

Process Wastes--Wastes are generated at the unloading dock, fish house, and cannery. While unloading the tenders or fishing boats, a small amount of blood and slime enters the bay as drainage from the fish conveyor and as pumpage from the fish holds. Heads that are removed at the fish house are discharged unground through the dock into the bay. Wastes from the iron chink and sliming tables (tails, fins, viscera) are collected in a central flume and discharged through a 10 cm (4 in.) pipe to the bay immediately under the dock. As a result of these discharges, during the in-plant visit the water under the dock was red and floating solids were observed.

A waste reduction plant is being built by Petersburg Fisheries, Inc. Upon completion of the plant, wastes from Petersburg Processors will be pumped to a location on land where the solids will be removed and delivered to Petersburg Fisheries for treatment. Heads were to be collected and sent there for processing starting approximately 1 September 1973. Company officials estimated that 30 percent (including eggs and heads) of the initial fish weight becomes waste material.

Food, Chemical and Research Laboratories, Inc., prepared analyses on the process wastewater from Petersburg Fisheries, Inc. This data summary is presented in Table VI-D17.

Treatment Needs

All wastes should be collected, screened to recover solid material, and the liquid passing through the screen should be discharged to the bottom of the bay at least 15 m (50 ft) from the face of the dock. As noted earlier, Petersburg Fisheries is constructing a waste reduction plant with sufficient capacity to process all solid salmon, shrimp and crab wastes that are generated by the seafood processors in the Petersburg area. As soon as this plant is in operation, the solids from Petersburg Processors should be recovered and delivered to Petersburg Fisheries for processing.

TABLE VI-D17

PETERSBURG FISHERIES, INC.
PROCESS WASTEWATER ANALYSES[a]

Parameter Analyzed	Results
pH	6.6
Total Solids - ppm	77,060
SS - ppm	47,560
Dissolved Solids - ppm	29,500
Volatile Solids - ppm	66,900
Alkalinity - ppm $CaCO_3$	6,183
BOD - ppm	58,000
COD - ppm	120,800
Turbidity - JTU	>10,000
Color - color unit	not applicable
Specific Conductance - μmhos	9.45×10^{-3}
Oil and Grease - ppm	12,000
Hardness - ppm $CaCO_3$	1,050
Chloride - ppm	3,376
Calcium - ppm	40
Magnesium - ppm	231
Zinc - ppm	none detected
Total nitrogen - ppm	7,965
Ammonia - ppm N	145
NO_2 - ppm N	not applicable
NO_3 - ppm N	30
Phosphate - ppm P	1,500
Coliform - MPN	12

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[a] Analyses were prepared by Food, Chemical and Research Laboratories, Inc.

D-10 THOMPSON FISH COMPANY, HOONAH, ALASKA

General

Thompson Fish Company, Hoonah, Alaska, operates a cold storage plant that was constructed in 1964. Salmon, caught by trolling, and halibut are processed at this plant. The company employs about 15 people. The plant normally operates 7 to 9 hr/day, 4 to 5 days/week during the processing season. While the plant is open year around, the majority of the work is done from April to October. During 1972, 72 kkg (600,000 lb) of salmon and 16 kkg (35,000 lb) of halibut were processed. An estimated 340 kkg (750,000 lb) of salmon and 61 kkg (135,000 lb) of halibut will be processed during 1973. The plant is large enough to freeze 45 kkg (10,000 lb) of fish per day.

A National Pollutant Discharge Elimination System (NPDES) application for this plant was filed on 1 May 1973. EPA personnel from National Field Investigations Center-Denver and Region X, Seattle, visited the plant on 4 August 1973. Mike Thompson, owner, provided information and assistance.

Water Supply

All industrial and domestic water used at the plant is obtained from Hoonah. Additional treatment of the water is not provided by the plant and the amount of water used was not available.

Process Operations

Salmon and halibut are off-loaded from fishing boats. The fish are usually dressed by the fishermen when they are caught. The fish are slimed, washed and, except for sockeye and chum salmon, heads are removed before freezing. The frozen fish are shipped by barge and ferry.

Waste Sources

Domestic Wastes--All domestic wastes are discharged directly into the bay without treatment. A new wastewater treatment plant is being constructed by the city. The domestic wastes will be discharged to the municipal sewer system upon completion of the treatment plant.

Refuse--Wastes including papers, boxes, and cans, are collected and hauled to the city dump for disposal. The volume of refuse generated was considered by the company to be small.

Process Wastes--The majority of the process wastes results from cleaning fish. As noted earlier, both salmon and halibut are cleaned by fishermen before delivery to the cold storage plant. Process wastes, including some heads, blood, slime, and viscera, are collected and discharged to the bay without treatment.

Treatment Needs

Domestic wastes should be discharged into the municipal sewer system upon completion of the wastewater treatment facility. Fish heads should be ground and pumped, along with other process wastes, into the tidal area of the bay.

D-11 WARDS COVE PACKING COMPANY, KETCHIKAN, ALASKA

General

Wards Cove Packing Company operates a salmon cannery at Ketchikan, Alaska [Figure VI-3]. Built in 1912, the cannery is located on Wards Cove adjacent to the Tongass Narrows [Figure VI-D12].

Salmon are processed from the middle of July to the end of August. The cannery employs about 115 people and operated 8 hr/day, 4 days/week in the 1973 season. Plant processing capacity is 550 cases/hr and 232,000 cases/season. As of 9 August 1973, 33,000 cases of salmon had been packed, of which 70 percent were estimated to be pink salmon. Plant production records* for 1970 and 1972 show that 58,000 and 89,000 cases, respectively, were canned.

A U. S. Army Corps of Engineers Refuse Act Permit Program (RAPP) application for this plant was filed 28 June 1971. On 9 August 1973, EPA personnel from the National Field Investigations Center-Denver and Region X, Seattle visited the plant. Winn Brindle, president, provided information and assistance.

Water Supply

All industrial and domestic water is provided by the Company and is chlorinated to maintain at least 1 ppm residual. The RAPP application indicates 380 m^3/day (100,000 gpd) is used by the plant. Of this total, 303 m^3/day (80,000 gpd) is used for process water, 38 m^3/day (10,000 gpd) for boiler feed water, and 38 m^3/day (10,000 gpd) for domestic water.

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* The cannery did not operate in 1971.

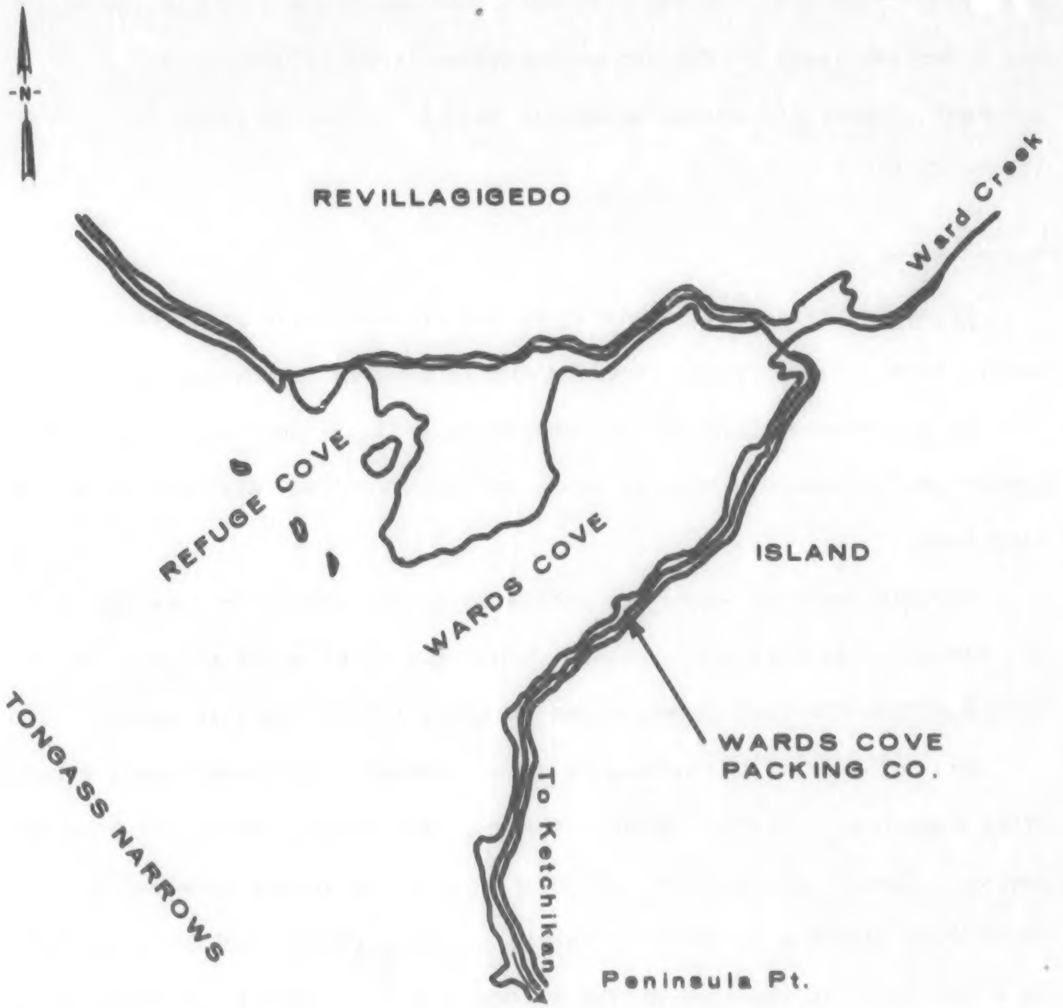
N
REVILLAGIGEDO
Ward Creek
REFUGE COVE
WARDS COVE
ISLAND
WARDS COVE PACKING CO.
TONGASS NARROWS
To Ketchikan
Peninsula Pt.

Figure VI-D12. Wards Cove Packing Company, Ketchikan, Alaska Location Map

Process Operation

The canning processing operation is conducted in a manner similar to that described in Section V [Figure V-1]. Heads are not processed for recovery of oil, but eggs are recovered and transported to the egg house for processing. The cannery operates three filler lines. A processing and waste source schematic for this plant is shown in Figure VI-D13.

Waste Sources

Domestic Wastes--All domestic wastes are collected and treated in a septic tank. The effluent from the septic tank is discharged into the bay.

Refuse--Combustible wastes consisting of paper and boxes are burned. Noncombustible wastes, such as cans, are collected and disposed of at the city dump.

Process Wastes--Wastes are generated at the unloading dock and in the cannery. As fish are unloaded, blood and slime enter the bay as drainage from the fish conveyor and as pumpage from the fish holds.

The majority of the process wastes, however, originate from the butchering operation. Wastes (heads, viscera, fish parts, and blood) from the indexer, iron chink, sliming tables and floor drains are conveyed to a flume which discharges into the bay at the edge of the dock at a depth of 18 m (60 ft). At the time of the survey, floating solids and scum were observed on the water surface in the vicinity of the outfall line.

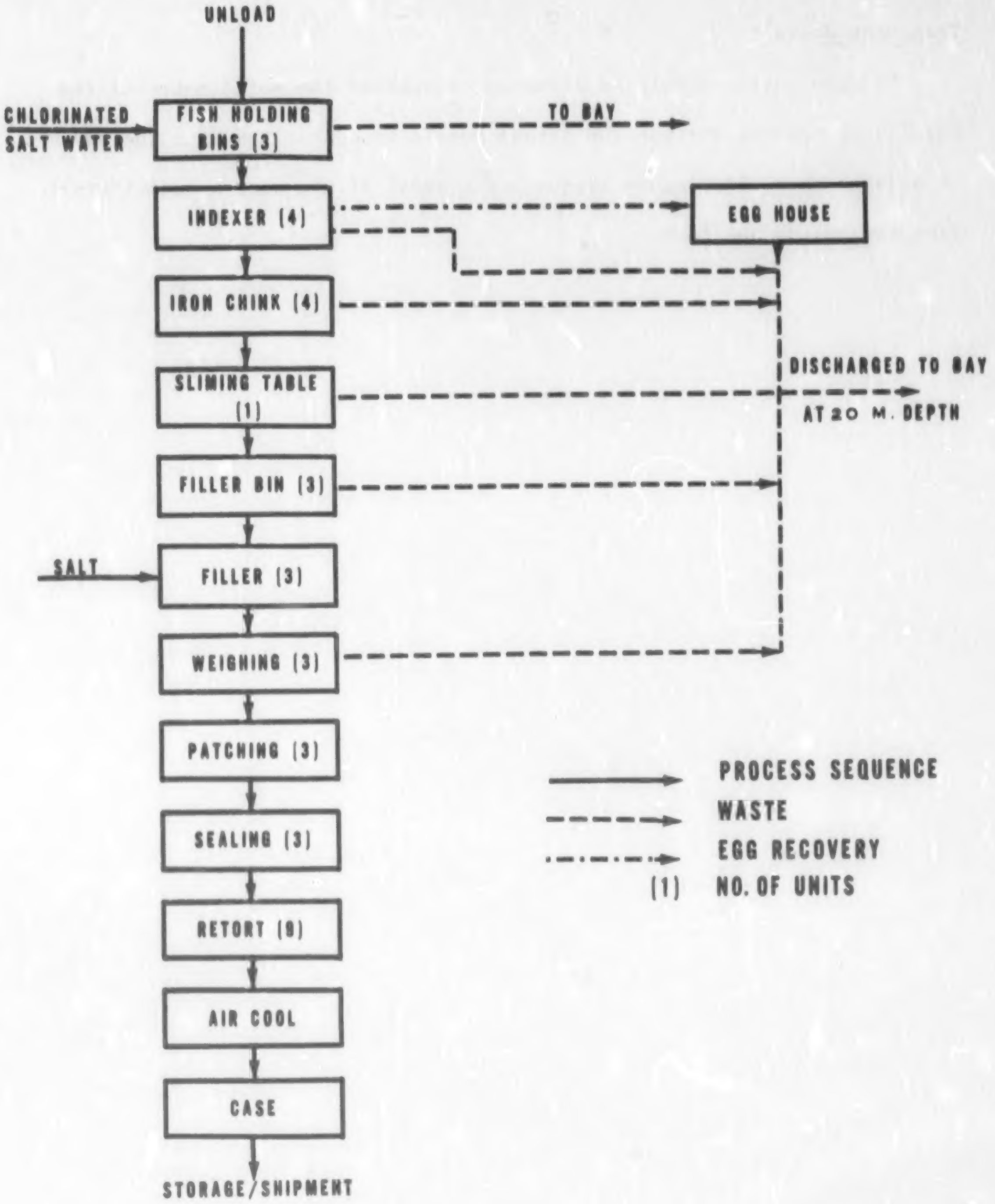
UNLOAD
CHLORINATED SALT WATER
FISH HOLDING BINS (3)
TO BAY
INDEXER (4)
EGG HOUSE
IRON CHINK (4)
SLIMING TABLE (1)
DISCHARGED TO BAY AT 20 M. DEPTH
FILLER BIN (3)
SALT
FILLER (3)
WEIGHING (3)
PATCHING (3)
SEALING (3)
RETORT (9)
AIR COOL
CASE
STORAGE/SHIPMENT
PROCESS SEQUENCE
WASTE
EGG RECOVERY
(1) NO. OF UNITS

Figure VI-D13. Salmon Canning Sequence, Wards Cove Packing Co., Ketchikan, Alaska

Treatment Needs

Process wastes should be screened to recover the solid material and the liquid passing through the screen should be discharged into the bay at a depth that will ensure adequate dispersal of the wastes and eliminate floating solids and scum.

D-12 WHITNEY-FIDALGO SEAFOODS, INC., PETERSBURG, ALASKA

General

Whitney-Fidalgo Seafoods, Inc., owns and operates a salmon processing cannery at Petersburg, Alaska [Figure VI-3]. The layout of the cold storage and canning facilities, built in 1946, is shown in Figure VI-D14.

The operating season for the complex begins in April and ends in October. During peak season, 100 people are employed. At the time of the survey, the cannery and cold storage facility had been operating 6 and 10 hr/day, 3 and 4 days/week, respectively. The plant production capacity is 3,200 cases per 18 hr day and the average production is 2,000 cases/day. The pre-season production estimate for 1973 was 45,000 cases; however, Company officials estimated the actual production would be from 25,000 to 35,000 cases. Recent production history is tabulated below.

Year	Annual Production (cases)
1972	27,000
1971	88,000
1970	30,000

A U.S. Army Corps of Engineers Refuse Act Permit Program (RAPP) application for this plant was filed 30 June 1971. EPA personnel from National Field Investigations Center-Denver and Region X, Seattle, visited the plant on 2 August 1973. Water quality investigations were conducted during the period 21 to 25 August 1973. John Enge, plant superintendent, and Eilert Holbeck, plant manager, provided information and assistance.

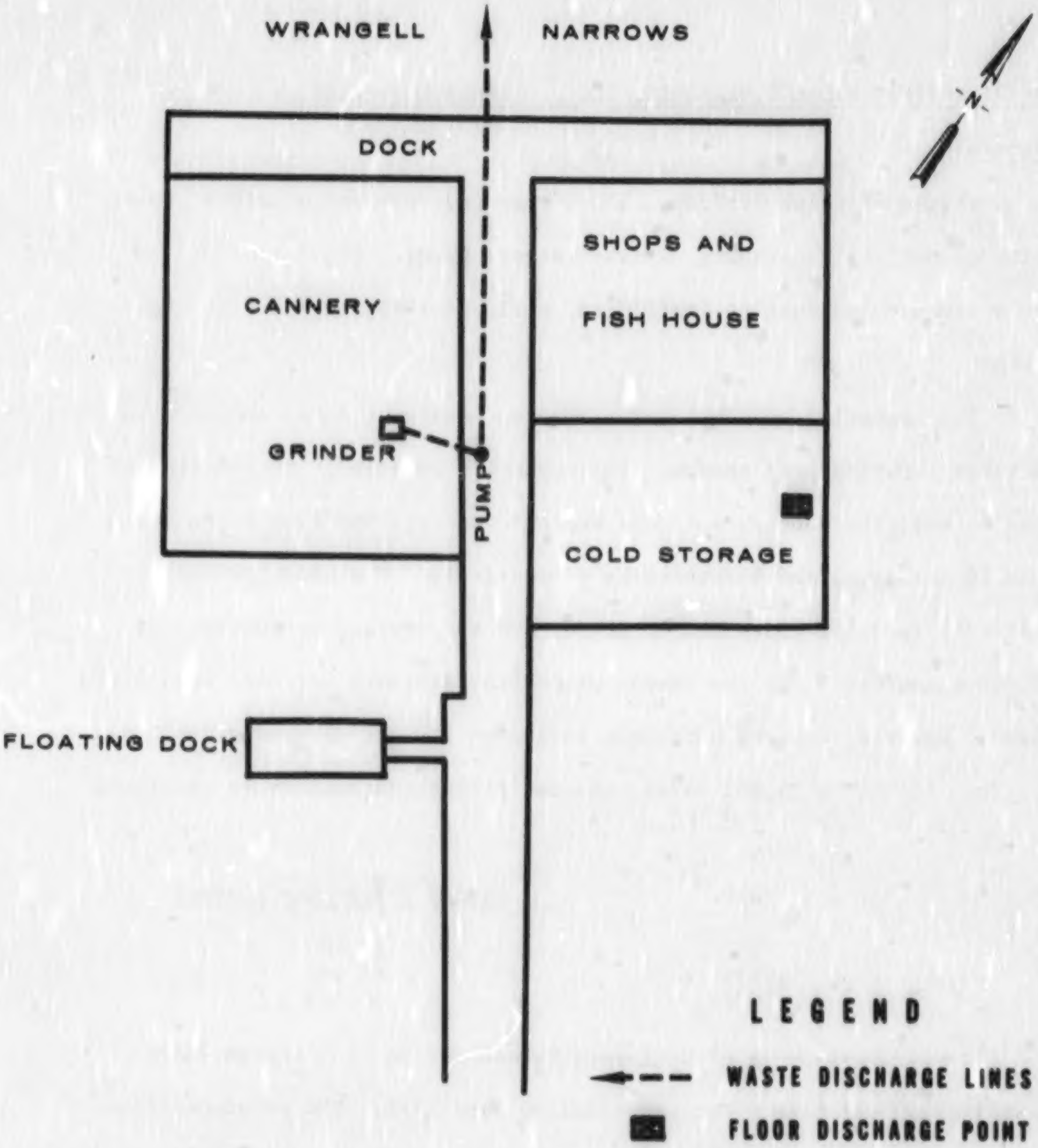
WRANGELL NARROWS
N
DOCK
CANNERY
SHOPS AND FISH HOUSE
GRINDER
PUMP
COLD STORAGE
FLOATING DOCK
LEGEND
WASTE DISCHARGE LINES
FLOOR DISCHARGE POINT

Figure VI–D14. Whitney – Fidalgo Seafoods, Petersburg, Alaska Plant Layout

Water Supply

According to the RAPP application, the city municipal system provides 1,515 m^3/day (0.4 mgd) of freshwater to the cannery which is used as follows:

In-Plant Water Usage	m^3/day	mgd
cooling water	755	0.2
boiler feed water	190	0.05
process water	550	0.146
sanitary system	15	0.004

Some process water is used through freshwater sprayers that have been installed on the unloading elevator at the dock to wash fish as they are unloaded.

Saltwater is used in fish storage bins and to flume fish eggs from the indexer to the egg house. The total estimated saltwater usage is 380 m^3/day (0.1 mgd). A metering system to determine the exact quantity of saltwater that is used does not exist.

All water is chlorinated at the cannery through the use of three gas chlorinators. A chlorine residual of 9 ppm is maintained for wash-down and fluming water. Company officials estimated that 91 kg (200 lb) of chlorine is used every nine operating days.

Process Operations

Salmon are off-loaded from tenders or fishing boats into a mechanical elevator. The fish are then sorted by species and graded with the choice grades processed by the cold storage facility. The remaining fish are processed in the cannery in a manner similar to that described in Section V [Figure V-1]. The cannery has two filler lines (one 1 lb line and one 1/2 lb line).

About 15 percent of the salmon heads are ground, frozen, and shipped to Anacortes, Wash. to be used in pet food. The remaining heads are wasted. The Company plans on installing screens next year to remove solids that will be sold to Petersburg Fisheries, Inc. for processing.

Waste Sources

Domestic Wastes--The domestic wastewater is discharged without treatment into the bay at the edge of the dock. A problem that complicates the evaluation of the cannery domestic discharge into the Narrows is the city wastewater discharge just south of the Whitney-Fidalgo plant. At present there is no disinfection of either the city or cannery wastewater discharges.

Refuse--Waste materials including boxes, cans and waste paper are collected and sent to the city dump for disposal.

Process Wastes--All wastes from the iron chink, sliming table and filler area, as well as fish heads that are not processed, are ground, pumped through a pipe, and discharged on the bottom of the bay at a point 18 m (60 ft) beyond the face of the dock. Solid deposits are not noticeable in the bay area because of the extreme tidal action. Whitney-Fidalgo estimated that 36 kg (80 lb) of raw fish are processed for every case of salmon; this gives an estimated 30 percent waste material.

On 7 August 1973 the Company had an oil spill while filling a storage tank under the dock. The company reported the spill to the Coast Guard and initiated definite and obvious cleanup procedures.

Receiving Water Evaluation

The results of the 21 to 25 August water quality investigation are discussed in this section under Petersburg Fisheries, Inc. (Section VI-D8). Hydrographic, chemical, and sediment data, collected at selected stations, showed no water quality problems and stabilized bottom materials.

Treatment Needs

The cannery should connect the domestic wastewater discharge to the city sewer system. Petersburg Fisheries, Inc. is constructing a waste reduction plant with the capacity for processing all solid fish, crab and shrimp wastes generated in the Petersburg area. Whitney-Fidalgo Seafoods is planning to screen their waste streams and send the solids to Petersburg Fisheries for processing. The exact method of transporting these solids had not yet been determined. Eliminating the discharge of these solids will ensure that no solids buildup occurs in the bay.

REFERENCES

1. "Fisherman to Accept Closure?", Anchorage Daily News, Vol. XXVII, No. 78:1-2. Anchorage, Alaska, 31 July 1973.

2. "Current Practice in Seafoods Processing Waste Treatment," U. S. Environmental Protection Agency, Water Pollution Control Research Series No. 12060 ECF04/70, Washington, D. C., Apr. 1970.

3. Cornell, Howland, Hayes, and Merryfield, Inc. "Seafood Cannery Waste Study, Phase 1 - 1971," prepared for National Canners, Inc., Northwest Research Laboratory, Seattle, Wash., Dec. 1971.

4. "Draft Development Document for Effluent Limitations Guidelines and Standards of Performance for the Canned and Preserved Fish and Seafoods Processing Industry," prepared for Environmental Protection Agency by Environmental Associates, Inc., Washington, D. C., July 1973.

5. "Alaska Seafood Processing," Environmental Protection Agency Working Paper No. 83 (Draft), Region X, Seattle, Wash., Nov. 1971.

6. "Water and Sewerage Systems, City of Sand Point, Alaska," Linck-Thompson, Engineers-Planners, Anchorage, Alaska, Dec. 1972.

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APPENDIX A

ALASKA WATER QUALITY STANDARDS

TITLE 18. ENVIRONMENTAL CONSERVATION 18 AAC 70.010
CHAPTER 70. WATER QUALITY STANDARDS 18 AAC 70.020

SECTION

010. Water Quality Standards
020. Establishment of Water Use Classifications and Criteria
030. Procedure for Determining Water Quality Criteria
040. Natural Conditions
050. Classification of State Waters
060. (Repealed)
070. (Consolidated into Sec. 20)
080. Minimum Treatment
081. Certificate of Reasonable Assurance
082. Public Notice of Application
083. Public Hearing
084. Notice of Public Hearing
085. Action Upon Application
090. Implementation and Enforcement Plan
100. Penalties
110. Definitions

18 AAC 70.010. WATER QUALITY STANDARDS. (a) The water quality standards set forth in this chapter apply to all waters of the state.

(b) Waters whose existing quality is better than the established standards shall be maintained at that high quality unless it has been affirmatively demonstrated to the department that a change is justifiable as a result of necessary economic or social development and that change shall not preclude present and anticipated use of such waters. Any industrial, public or private project or development which would constitute a new source of pollution or an increased source of pollution to high quality waters shall provide the highest degree of practicable treatment to maintain the high water quality. In implementing this policy, the Administrator of the Environmental Protection Agency will be kept advised in order to be able to discharge his responsibilities under the Federal Water Pollution Control Act as amended. (In effect before 7/28/59; am 5/24/70, Register 34; am 8/28/71, Register 39; am 10/22/72, Register 44).

AUTHORITY: AS 46.03.010
AS 46.03.020 (10) (A)
AS 46.03.070
AS 46.03.080

18 AAC 70.020. ESTABLISHMENT OF WATER USE CLASSIFICATIONS AND CRITERIA. (a) There are established seven water use classifications which are designated by the letters "A" through "G", inclusive. The water use classifications are as follows:

(1) Class A. Water supply, drinking, culinary, and food processing without the need for treatment other than simple disinfection and simple removal of naturally present impurities.

(2) Class B. Water supply, drinking, culinary, and food processing with the need for treatment equal to coagulation, sedimentation, filtration, disinfection, and any other treatment processes necessary to remove naturally present impurities.

(3) Class C. Water contact recreation.

(4) Class D. Growth and propagation of fish and other aquatic life, including waterfowl and furbearers.

(5) Class E. Shellfish growth and propagation, including natural and commercial growing areas.

(6) Class F. Agricultural water supply, including irrigation, stock watering, and truck farming.

(7) Class G. Industrial water supply (other than food processing).

(b) The water quality criteria applicable to each water use classification are as follows.

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Notes:

1. Organisms of the coliform group shall be determined by Most Probable Number or equivalent membrane filter technique.

2. Wherever cited in these standards, the National Shellfish Sanitation Program, Manual of Operations, Part 1, means Sanitation of Shellfish Growing Areas, 1965 revision, U.S. Department of Health , Education and Welfare, Public Health Service Publication No. 33, Part 1, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, 20402 (Price 45 cents), or in any regional office of the Department of Environmental Conservation, and which is on file in the office of the lieutenant governor.

3. Induced variation of pH conditions naturally outside this range may not exceed 0.5 pH unit and the pH change shall be only in the direction of this range. pH conditions naturally within this range shall be maintained within 0.5 pH unit of the natural pH.

4. Wherever cited in these standards, USPHS Drinking Water Standards mean the Public Health Service Drinking Water Standards, 1962 revision, U.S. Department of Health, Education and Welfare, Public Health Service Publication No. 956, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington D. C. 20402 (Price 30 cents) or from any regional office of the Department of Environmental Conservation, and which is on file in the office of the lieutenant governor.

5. Wherever cited in these standards, National Bureau of Standards Handbook 69 means the handbook entitled "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and Water for Occupational Exposure", U.S. Department of Commerce, National Bureau of Standards Handbook 69, June 5, 1959, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402, or in any regional office of the Department of Environmental Conservation, and which is on file in the office of the lieutenant governor.

6. Wherever cited in these standards, Radiation Protection Guides means the guidelines recommended by the former Federal Radiation Council and published in the May 18, 1960 Federal Register, and published in the September 26, 1961 Federal Register, obtainable from any Regional Office of the Department of Environmental Conservation and which are on file in the office of the lieutenant governor.

(c) The analytical procedures used as methods of analysis to determine the quality of waters shall be in accordance with the 13th edition of Standard Methods for the Examination of Water and Wastewater, published by the Water Pollution Control Federation, the American Water Works Association and the American Public Health Association, (publication office: American Public Health Association, 1740 Broadway, New York, New York 10019), or in accordance with other standards mutually approved by the

department and the U.S. Environmental Protection Agency. (In effect before 7/28/59; am 5/24/70, Register 34; am 8/28/71, Register 39; am 10/22/72, Register 44; am 8/12/73, Register 47).

AUTHORITY: AS 46.03.020 (10) (A)
AS 46.03.070
AS 46.03.080

18 AAC 70.030. PROCEDURE FOR DETERMINING WATER QUALITY CRITERIA. In determining the appropriate water quality criteria for any waters or portion of waters, the department shall adhere to the following procedure:

(1) if waters have more than one classification, the most stringent water quality criterion of all the classifications shall apply; and

(2) if a tributary water either receives a sewage waste discharge or industrial waste discharge, or has a lower classification than the confluence water, and the tributary water affects the quality of the confluence water, the most stringent water quality criteria applicable to either the tributary water or the confluence water shall apply to the tributary water; and

(3) waste discharge permits will define a mixing zone outside of which violations of the criteria will be determined. The mixing zone will be limited to a volume of the receiving water that will

(A) not interfere with biological communities or populations of important species to a degree which is damaging to the ecosystem, and

(B) not diminish other beneficial uses disproportionately. In effect before 7/28/59; am 5/24/70, Register 34; am 8/28/71, Register 39; am 10/22/72, Register 44; am 8/12/73; Register 47).

AUTHORITY: AS 46.03.020 (10) (A)
AS 46.03 070
AS 46.03.080

18 AAC 70.040. NATURAL CONDITIONS. Waters may have natural characteristics which would place them outside the criteria established by this chapter. The criteria established in this chapter apply to man-made alterations to the waters of the state. (In effect before 7/28/59; am 5/24/70, Register 34; am 8/28/71, Register 39; am 10/22/72, Register 44).

AUTHORITY: AS 46.03.020 (10 (A)
AS 46.03.070
AS 46.03.080

18 AAC 70.050. CLASSIFICATION OF STATE WATERS. (a) Waters of the state that have been classified after public hearing, and their designated classes according to the Water Quality Standards are as follows:

(1) Ship Creek - near Anchorage, Alaska - from the Ship Creek diversion structure at river mile 11.5 to the confluence with the Knik Arm of Cook Inlet - Classes B, C, D, & G.

18 AAC 70.020 WATER QUALITY CRITERIA FOR WATERS OF THE STATE OF ALASKA

18 AAC 70.020 WATER QUALITY CRITERIA FOR WATERS OF THE STATE OF ALASKA

Water Quality Parameters / Water Uses	(1) Total Coliform Organisms (see note 1)	(2) Dissolved Oxygen mg/l or % Saturation	(3) pH (see note 2)	(4) Turbidity, measured in Jackson Turbidity Units (JTU)	(5) Temperature, as measured in degrees Fahrenheit (°F)	(6) Dissolved Inorganic Substances	(7) Residues including Oils, Floating Solids, Sludge Deposits and Other Wastes	(8) Settleable solids suspended solids (includes sediment & dredge spoil & fill)	(9) Toxic or Other Deleterious Substances, Pesticides and Related Organic and Inorganic Materials	(10) Color, as measured in color units	(11) Radioactivity	(12) Aesthetic Considerations	Water Quality Parameters / Water Uses
A. Water supply, drinking, culinary and food processing without the need for treatment other than simple disinfection and simple removal of naturally present impurities.	Mean of 5 or more samples in any month may not exceed 50 per 100 ml, except ground water shall contain zero per 100 ml.	Greater than 75% saturation or 5 mg/l.	Between 6.5 and 8.5	Less than 5 JTU	Below 60°F	Total dissolved solids from all sources may not exceed 500 mg/l.	Same as B-7	Below normally detectable amounts.	Carbon chloroform extracts less than 0.1 mg/l and other chemical constituents may not exceed USPHS Drinking Water Standards. (see note 4)	True color less than 15 color units.	The concentrations of radioactivity shall not: a) Exceed 1/30th of the MPCW values given for continuous occupational exposure in the National Bureau of Standards Handbook No. 69. b) Exceed the concentrations specified in the 1962 U.S. Public Health Service Drinking Water Standards for waters used for domestic supplies. c) Have a demonstrable detrimental effect on aquatic life. d) The concentration of radioactive materials in these waters shall be less than those required to meet the Radiation Protection Guides for maximum exposure of critical human organs recommended by the former Federal Radiation Council in the case of foodstuffs harvested from these waters for human consumption. Because any human exposure to ionizing radiation is undesirable, the concentration of radioactivity in these waters shall be maintained at the lowest practicable level.	May not be impaired by the presence of materials or their effects which are offensive to the sight, smell, taste or touch.	Water supply, drinking, culinary and food processing without the need for treatment other than simple disinfection and simple removal of naturally present impurities.
B. Water supply, drinking, culinary and food processing with the need for treatment equal to coagulation, sedimentation, filtration, disinfection and any other treatment processes necessary to remove naturally present impurities.	Mean of 5 or more samples in any month may not exceed 5000 per 100 ml, and not more than 20% of samples during any month may exceed 2000 per 100 ml, except ground water shall contain zero per 100 ml.	Greater than 60% saturation or 5 mg/l.	Between 6.5 and 8.5	Less than 5 JTU above natural conditions.	Below 60°F.	Numerical value is inapplicable.	Residues may not make the receiving water unfit or unsafe for the uses of this classification, nor cause a film or sheen upon, or discoloration of, the surface of the water or adjoining shoreline, nor cause a sludge or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom or upon adjoining shorelines.	No imposed loads that will interfere with established levels of water supply treatment.	Chemical constituents shall conform to USPHS Drinking Water Standards. (see note 4)	Same as A-10		Same as A-12	Water supply, drinking, culinary and food processing with the need for treatment equal to coagulation, sedimentation, filtration, disinfection and any other treatment processes necessary to remove naturally present impurities.
C. Water Contact Recreation	Same as B-1	Greater than 5 mg/l.	Between 6.5 and 8.5	Below 25 JTU except when natural conditions exceed this figure effluents may not increase the turbidity.	Numerical value is inapplicable.	Numerical value is inapplicable.	Same as B-7	No visible concentrations of sediment.	Below concentrations found to be of public health significance.	Secchi disc visible at min. depth of 1 meter.		Same as A-12	Water Contact Recreation
D. Growth and propagation of fish and other aquatic life, including waterfowl and furbearers.	Same as B-1 to protect associated recreational values.	Greater than 6 mg/l in salt water and greater than 7 mg/l in fresh water.	Between 7.5 and 8.5 for salt water. Between 6.5 and 8.5 for fresh water.	Less than 25 JTU when attributable to solids which result from other than natural origin.	May not exceed natural temp. by more than 2°F for salt water. May not exceed natural temp. by more than 2°F for fresh water. No change shall be permitted for temp. over 60°F. Maximum rate of change permitted is 0.5°F per hr.	Within ranges to avoid chronic toxicity or significant ecological change.	Same as B-7 plus the following: Residues shall be less than those levels which cause tainting of fish or other organisms and less than acute or chronic problem levels as determined by bioassay.	No deposition which adversely affects fish & other aquatic life reproduction and habitat.	Concentrations shall be less than those levels which cause tainting fish, less than acute or chronic problem levels as revealed by bioassay or other appropriate methods and below concentrations affecting the ecological balance.	Same as C-10		Same as A-12	Growth and propagation of fish and other aquatic life, including waterfowl and furbearers.
E. Shellfish growth and propagation including natural and commercial growing areas.	Not to exceed limits specified in National Shellfish Sanitation Program Manual of Operations, Part I, (1965) (see note 3)	Greater than 6 mg/l in the larval stage. Greater than 5 mg/l in the adult stage.	Between 7.5 and 8.5	Same as D-4.	Less than 60°F.	Within ranges to avoid chronic toxicity or significant ecological change.	Same as B-7	No deposition which adversely affects growth and propagation of shellfish.	Same as D-9	Same as C-10		Same as A-12	Shellfish growth and propagation including natural and commercial growing areas.
F. Agricultural water supply, including irrigation, stock watering, and truck farming.	Mean of 5 or more samples may not exceed 5000 per 100 ml with 20% of samples not to exceed 2000 per 100 ml for livestock watering, for irrigation of crops for human consumption, and for general farm use, except ground water shall contain zero per 100 ml.	Greater than 3 mg/l.	Between 6.0 and 8.5	Numerical values are inapplicable.	Between 60°F and 70°F for optimum growth to prevent physiological shock to plants.	Conductivity less than 750 micromhos at 25°C. Sodium adsorption ratio less than 2.5, sodium percentage less than 60%, residual carbonate less than 1.25 mg/l, and boron less than 0.3 mg/l.	Same as B-7	For sprinkler irrigation, water free of particles of 0.074 mm or coarser. For irrigation or water spreading, not to exceed 200 mg/l for an extended period of time.	Less than that shown to be deleterious to livestock or plants or their subsequent consumption by humans.	Inapplicable		Same as A-12	Agricultural water supply, including irrigation, stock watering and truck farming.
G. Industrial water supply (other than food processing).	Same as B-1 whenever worker contact is present.	Greater than 5 mg/l for surface water.	Between 6.5 and 8.5	No imposed turbidity that may interfere with established levels of water supply treatment.	Less than 70°F.	No amounts above natural conditions which may cause undue corrosion, scaling, or process problems.	Same as B-7	No imposed loads that will interfere with established levels of treatment.	Chemical constituents may not exceed concentrations found to be of public health significance.	Same as C-10		Same as A-12	Industrial water supply (other than food processing).

(2) Chena River - near Fairbanks, Alaska - from the confluence of the Chena River and Chena Slough to the confluence of the Chena River and Tanana River - Classes C & D.

(3) All other marine and estuarine waters - Classes C, D, E & G.

(4) The ground waters of the state - Classes A, B, F, & G.

(b) The other fresh waters of the state are generally in their original and natural conditions and as such are considered suitable to serve all classifications established in sec. 20 of this chapter and are so classified, until reclassified. (In effect before 7/28/59; am 5/24/70, Register 34; am 8/28/71, Register 39; am 10/22/72, Register 44; am 8/12/73, Register 47).

AUTHORITY: AS 46.03.020 (10) (A)
AS 46.03.070
AS 46.03.080

18 AAC 70.060. PERMITS. Repealed 10/22/72. (In effect before 7/28/59; am 5/24/70, Register 34; am 10/22/72, Register 44).

18 AAC 70.070. TABLE - WATER QUALITY CRITERIA FOR WATERS OF THE STATE OF ALASKA. Consolidated into sec. 20 (b) 10/22/72. (In effect before 7/28/59; am 5/24/70, Register 34; am 8/28/71, Register 39; am 10/22/72, Register 44).

18 AAC 70.080. MINIMUM TREATMENT. Secondary treatment is required for all domestic sewage wastes. All industrial waste discharges are required to have treatment equivalent to best practicable control technology currently available as shall be defined for each industrial waste. If secondary treatment for domestic sewage and best practicable control technology currently available for industrial wastes is inadequate to achieve water quality criteria as defined in sec. 20 of this chapter, higher levels of treatment will be required. (Eff. 8/24/70, Register 34; am 8/28/71, Register 39; am 10/22/72, Register 44; am 8/12/73, Register 47).

AUTHORITY: AS 46.03.020 (10) (A)
AS 46.03.070
AS 46.03.080
AS 46.03.710

18 AAC 70.081. CERTIFICATE OF REASONABLE ASSURANCE. The department may issue certification that there is a reasonable assurance, as determined by the department, that a proposed activity will comply with the requirements of section 401 of the Federal Water Pollution Control Act Amendments of 1972, 86 Stat. 816. (Eff. 12/16/70, Register 36; am 10/22/72, Register 44; am 8/12/73, Register 47).

AUTHORITY: AS 46.03.020 (9)
AS 46.03.020 (10) (A)

18 AAC 70.082. PUBLIC NOTICE OF APPLICATION. (a) When certification pursuant to sec. 81 of this chapter has been requested, the department shall cause to be published a public notice of the application. The public notice shall invite interested parties to submit to the department comments regarding the proposed certification. Such comments shall be received by the department until 30 days after the publication of the public notice provided for in this section. The public notice may be issued jointly with the federal permitting agency.

(b) The public notice of application shall contain the name and address of the applicant, the activity sought to be certified as in compliance with the water quality standards, the location of the affected waters, and the location and type of discharge.

(c) The public notice of application shall be published at least once in a newspaper having general circulation within the borough in which the proposed activity will take place; however, if the proposed activity will take place in the unorganized borough, or if there is no newspaper of general circulation within the borough, then the newspaper shall be one of general circulation within the judicial district in which the proposed activity will take place. (Eff. 12/16/70, Register 36; am 10/22/72, Register 44; am 8/12/73, Register 47).

AUTHORITY: AS 46.03.020 (9)
AS 46.03.020 (10) (A)

18 AAC 70.083. PUBLIC HEARING. In addition to the notice of application provision of this chapter, the department may hold public hearings on certification applications. (Eff. 12/16/70, Register 36; am 10/22/72, Register 44).

AUTHORITY: AS 46.03.020 (9)
AS 46.03.020 (10) (A)

18 AAC 70.084. NOTICE OF PUBLIC HEARING. (a) If a public hearing is to be held, the department shall cause to be published a notice of public hearing in the manner set forth in sec. 82 (c) of this chapter. The notice shall contain the time and place of the public hearing, a summary of the certification application and all other information specified in sec. 82 of this chapter. The department may combine the notice of application provided for in sec. 82 of this chapter with the notice of public hearing provided for in this section.

(b) If a public hearing on the application for certification is to be held, it shall be held no sooner than 30 days after publication of the notice of public hearing. At the hearing, the department may receive comments from the public and other individuals, entities, or governmental agencies involved, together with comments from the applicant. Such comments may be filed with the department in writing at or before the time of the hearing, and reasonable oral comments shall be permitted.

(c) Nothing in this chapter shall prevent the consideration of more than one application at any public hearing when proper public notice has been given. (Eff. 12/16/70, Register 36; am 10/22/72, Register 44).

AUTHORITY: AS 46.03.020 (9)
AS 46.03.020 (10) (A)

18 AAC 70.085. ACTION UPON APPLICATION. The department may take action upon an application for certification any time after a 30 day period has elapsed from the date of publication of the notice provided for in sec. 82 of this chapter. However, if a public hearing is held as provided in sec. 83 of this chapter, the department may act upon the application any time after the public hearing. (Eff. 12/16/70, Register 36; am 10/22/72, Register 44).

AUTHORITY: AS 46.03.020 (9)
AS 46.03.020 (10) (A)

18 AAC 70.090. IMPLEMENTATION AND ENFORCEMENT PLAN. The plan for implementing and enforcing sec. 80 of this chapter shall be based upon achieving the minimum levels of treatment specified in that section at the time of construction for new discharges and as soon as possible but not later than July 1977 for existing discharges, and the plan shall consist of the following elements:

(1) waste discharge permits issued by the department and those federal permits issued within the state and certified by the state pursuant to sec. 81 of this chapter;

(2) the Water Pollution Control Program Plan of the department; and

(3) plans developed by the department while implementing the "continuing planning process" required by sec. 303 (e) of the Federal Water Pollution Control Act Amendments of 1972, 86 Stat. 816. (Eff. 8/28/71, Register 39; am 8/12/73, Register 47).

AUTHORITY: AS 46.03.020 (10) (A)
AS 46.03.060
AS 46.03.070

18 AAC 70.100. PENALTIES. A person who violates any provision of this chapter is punishable by the appropriate penalties contained in AS 46.03.760 and AS 46.03.790. These penalties include the possibility of a punishment by fine of not more than $25,000 or by imprisonment for not more than one year or both. (Eff. 10/22/72, Register 44; am 8/12/73, Register 47).

AUTHORITY: AS 46.03.020 (10) (A)
AS 46.03.710
AS 46.03.760

18 AAC 70.110. DEFINITIONS. Unless the context indicates otherwise, in this chapter

(1) "commissioner" means the commissioner of the Department of Environmental Conservation.

(2) "contact recreation" means any form of recreation involving deliberate or accidental contact with water, including but not limited to swimming, water skiing, fishing, and commercial and recreational boating.

(3) "department" means the Department of Environmental Conservation.

(4) "dredge spoil and fill" means unpolluted solid material including but not limited to sand, silt, clay and rock which may be placed in the waters of the state, provided that it is placed in the water in a manner such that it does not interfere with any designated water use.

(5) "ground water" means water in the zone of saturation, which is the zone below the water table in which all interstices are filled with water.

(6) "primary treatment" means the method of removal of settleable, suspended and floatable solids from water by the application of mechanical forces or gravitational forces, or both and may include processes such as sedimentation, flotation, screening, centrifugal action, vacuum filtration, dissolved air flotation, and others designated to remove settleable, suspended and floatable solids.

(7) "secondary treatment" means that method of removal of dissolved and colloidal materials that in their unaltered state, as found in water, are not amenable to separation through the application of mechanical forces or gravitational forces or both. Secondary treatment may include processes such as bio-absorption, biological oxidation, wet combustion, other chemical reactions, and adsorption on surface-active media, change of phase, or other processes that result in the removal of colloidal and dissolved solids from waters.

(8) "sheen" means an iridescent appearance on the surface of the water.

(9) "sludge" means a combination of solids and liquids including but not limited to an aggregate of oil or oil and matter of any other kind having a combined specific gravity equivalent to or greater than that of water. Sludge does not mean dredge spoil and fill.

(10) "waters" means lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, straits, passages, canals, the Pacific Ocean, Gulf of Alaska, Bering Sea and Arctic Ocean, in the territorial limits of the state, and all other bodies of surface or underground water, natural or artificial, public or private, inland or coastal, fresh or salt, which are wholly or partially in or bordering upon the state or under the jurisdiction of the state. (am 5/24/70, Register 34; am 8/28/71, Register 39; am 10/22/72, Register 44; am 8/12/73, Register 47).

AUTHORITY: AS 46.03.020 (10) (A)
AS 46.03.070
AS 46.03.080

APPENDIX B

RATIONALE FOR EFFLUENT LIMITATIONS
ALASKA SEAFOOD PROCESING WASTE

Prepared by

National Field Investigations Center - Denver
Denver, Colorado

APPENDIX B

RATIONALE FOR EFFLUENT LIMITATIONS ALASKA SEAFOOD PROCESSING WASTE

There are three basic methods of disposal of seafood wastes to the receiving waters practiced by the Alaskan processors; wastes are 1) collected, flumed, and discharged to the receiving waters either ground or unground, 2) collected and flumed to a gurry scow for transport to a disposal area away from the plant, and 3) directly discharged through holes in the floor to the beaches and waters below the facility.

The results of water quality studies and in-plant evaluations of twenty-six seafood processors, conducted from June through August, 1973, indicated that scouring and dispersion by tides is the overriding factor in the degree of treatment required for process wastes. Where outfalls are situated in fast moving tidal areas, and are submerged below lower low water, dispersion is generally adequate to prevent bottom deposits of discharged solids, and the water quality problems that are almost always associated with such deposits. Where outfalls are not so situated, bottom deposits and/or esthetic problems were observed and were, with few exceptions, associated with water quality problems, i.e., depressed dissolved oxygen, floating solids, presence of Vibrio.

Permit conditions for the Alaska seafood processing Industry are recommended based on the above considerations. Permits will be written for three separate categories; 1) salmon processing plants which were determined to cause water quality problems, 2) shrimp and crab processors, and 3) the remaining salmon processing plants which do not fall under the first category.

CATEGORY 1 - WATER QUALITY CONSIDERATIONS

Criteria used for water quality considerations were accumulation of solids, either on the beach or in the water, depressed DO, and tidal influences. Processors which discharged through the floors, especially in the Naknek River area, caused numerous solids deposits which were not removed by the tides. Processors in Cordova discharged into an area where tides either did not flush the wastes away, or carried them into the small boat harbor. Processors on the Alaska Peninsula discharged to areas where solids were not dispersed or to areas where the solids were washed back to the beach.

To protect water quality, the method of disposal is either collection, grinding, and discharge below mean lower low water or by screening all process wastes with subsequent disposal of solids by either reduction, or transport without loss of solids to a specified area within the baseline, or disposal by other approved method. In the case of the former, the area within a 100 ft radius of the outfall pipe is to be monitored to determine if solid deposits are accumulating. If solids are accumulating then the process wastes must be screened prior to discharge, and the retained solids must be disposed of by reduction, or by transport to a specified area within the baseline, or by other approved method. The screening is to occur no later than one year following the date when solids are found to be accumulating. Various researchers feel that the discharged solids are beneficial to the fishery. The first approach allows the processors to dispose of wastes without unnecessary, perhaps intolerable, economic hardships caused by screening and barging and requires only that economic impact necessary to attain adequate dispersal. However, if water quality problems do occur, then the screening and barging requirement will be implemented.

Numerical limits, such as the 5 ml/l (max) to 2 ml/l (average) settleable solids limitation in the Kodiak permits, could not be expected to prevent bottom deposits in sheltered water, while adequate dispersion of much greater concentrations of solids can be attained in fast moving tidal waters. The sizes of screening devices to be used are the same as those specified in the Kodiak permits.

Because most of the processors do not know what quantity of water is used, flow recording devices will be specified to be installed and monitored daily. This will give the EPA and the processor needed information of process water requirements.

The initial permit conditions allow the permittee to discharge as presently practiced until July 1, 1975 (grinding) or July 1, 1977 (screening).* After this date, all wastes must meet the final effluent limitations. The only numerical limits imposed were the daily average and daily maximum flows reported in the Refuse Act Permit Program application, and the pH range of 6.0 to 9.0. The requirement for effluent limitations in terms of weight of pollutant is simply irrelevant to the Alaskan seafood industry for the reasons set forth previously for settleable solids. Dispersion is the key factor and dispersion is contingent upon tidal action. There can be no viable justification for imposition of an unnecessarily restrictive weight limit upon processors located where tidal action provides adequate dispersion.

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* If screening is required, then the processors must grind the wastes to a particle size of 1.27 cm (0.50 in.) or less for initial permit conditions.

The schedule of compliance is based on what is believed to be reasonable time periods for the planning and construction of facilities to meet the initial and final effluent limitations dates.

The monitoring and reporting schedule for all processors discharging through the submerged outfall was established as sampling once every two weeks and reporting the data monthly, postmarked no later than the fifth day of the following month. This was done because the processing season is short, one to three months, and water quality problems could go unreported through the season if a three month reporting schedule was used. Monitoring was not required in the discharge area specified for disposal of screened solids by barges. The areas were selected from navigation charts to provide adequate depth and dispersion.

CATEGORY 2 - SHRIMP AND CRAB

Permits for this category will contain conditions prescribed in the interim guidelines.

CATEGORY 3 - REMAINING SALMON PROCESSORS

All remaining permits for salmon processors will be developed using the collection, fluming, grinding and deep water disposal method with subsequent monitoring for solids accumulation. If solids accumulate, then screening and barging (or reduction or other approved method of disposal) will be required.

SANITARY WASTES

Most processors discharge raw sanitary wastes to the receiving waters. Some have package aeration plants, some have septic tanks or seepage pits, and others will have or do have access to municipal sewers. The Alaska Water Quality Guidelines require that sanitary wastes receive secondary treatment (Alaska does not define secondary treatment).

All processors will be required to 1) totally confine (subsurface treatment) all sanitary wastes (septic tank with leach field), 2) discharge to a treatment facility that is providing secondary treatment or is on an approved compliance schedule, or 3) provide secondary treatment (40 CFR 133) using a package plant, etc., if discharged by the facility.

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APPENDIX C

EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR THE CANNED AND PRESERVED SEAFOOD PROCESSING POINT SOURCE CATEGORY

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 408]

EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR THE CANNED AND PRESERVED SEAFOOD PROCESSING POINT SOURCE CATEGORY

Notice of Proposed Rulemaking

Notice is hereby given that effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources set forth in tentative form below are proposed by the Environmental Protection Agency (EPA) for the farm-raised catfish processing of more than 908 kg (2000 lbs) of raw material per day subcategory (Subpart A), farm-raised catfish processing of 908 kg (2000 lbs) or less of raw material per day subcategory (Subpart B), conventional blue crab processing subcategory (Subpart C), mechanised blue crab processing subcategory (Subpart D), Alaskan crab meat processing subcategory (Subpart E), Alaskan whole crab and crab section processing subcategory (Subpart F), dungeness and tanner crab processing in the contiguous States subcategory (Subpart G), Alaskan shrimp processing subcategory (Subpart H), Northern shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart I), Northern shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart J), Southern non-breaded shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart K), Southern non-breaded shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart L), breaded shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart M), breaded shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart N), and tuna processing subcategory (Subpart O) of the canned and preserved seafood processing category of point sources pursuant to sections 301, 304 (b) and (c), 306(b) and 307(c) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251, 1311, 1314 (b) and (c), 1316(b) and 1317(c); 86 Stat. 816 et seq.; Pub. L. 92–500) (the "Act").

(a) Legal authority.

(1) Existing point sources.

Section 301(b) of the Act requires the achievement by not later than July 1, 1977, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of the Act. Section 301(b) also requires the achievement by not later than July 1, 1983, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of best available technology economically achievable which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 304(b) of the Act.

Section 304(b) of the Act requires the Administrator to publish regulations providing guidelines for effluent limitations setting forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available and the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods and other alternatives. The regulations proposed herein set forth effluent limitations guidelines, pursuant to section 304(b) of the Act, for the farm-raised catfish processing of more than 908 kg (2000 lbs) of raw material per day subcategory (Subpart A), farm-raised catfish processing of 908 kg (2000 lbs) or less of raw material per day subcategory (Subpart B), conventional blue crab processing subcategory (Subpart C), mechanised blue crab processing subcategory (Subpart D), Alaskan crab meat processing subcategory (Subpart E), Alaskan whole crab and crab section processing subcategory (Subpart F), dungeness and tanner crab processing in the contiguous States subcategory (Subpart G), Alaskan shrimp processing subcategory (Subpart H), Northern shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart I), Northern shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart J), Southern non-breaded shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart K), Southern non-breaded shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart L), breaded shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart M), breaded shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart N), and tuna processing subcategory (Subpart O) of the canned and preserved seafood processing category of point sources.

(2) New sources.

Section 306 of the Act requires the achievement by new sources of a Federal standard of performance providing for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achieveable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including where practicable, a standard permitting no discharge of pollutants.

Section 306(b)(1)(B) of the Act requires the Administrator to propose regulations establishing Federal standards of performance for categories of new sources included in a list published pursuant to Section 306(b)(1)(A) of the Act. The Administrator published in the FEDERAL REGISTER of January 16, 1973, (38 FR 1624) a list of 27 source categories, including the canned and preserved seafood processing source category. The regulations proposed herein set forth the standards of performance applicable to new sources for the farm-raised catfish processing of more than 908 kg (2000 lbs) of raw material per day subcategory (Subpart A), farm-raised catfish processing of 908 kg (2000 lbs) or less of raw material per day subcategory (Subpart B), conventional blue crab processing subcategory (Subpart C), mechanized blue crab processing subcategory (Subpart D), Alaskan crab meat processing subcategory (Subpart E), Alaskan whole crab and crab section processing subcategory (Subpart F), dungeness and tanner crab processing in the contiguous States subcategory (Subpart G), Alaskan shrimp processing subcategory (Subpart H), Northern shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart I), Northern shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart J), Southern non-breaded shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart K), Southern non-breaded shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart L), breaded shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart M), breaded shrimp processing in the contiguous states of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart N), and tuna processing subcategory (Subpart O) of the canned and preserved seafood processing category of point sources.

Section 307(c) of the Act requires the Administrator to promulgate pretreatment standards for new sources at the same time that standards of performance for new sources are promulgated pursuant to section 306. §§ 408.15, 408.25, 408.35, 408.45, 408.55, 408.65, 408.75, 408.85, 408.95, 408105, 408.115, 408.125, 408.135, 408145, and 408.155, proposed below, provide pretreatment standards for new sources within the farm-raised catfish processing of more than 908 kg (2000 lbs) of raw material per day subcategory (Subpart A), farm-raised catfish processing of 908 kg (2000 lbs) or less of raw material per day subcategory (SubpartB), conventional blue crab processing subcategory (Subpart C), mechanised blue crab processing subcategory (Subpart D), Alaskan crab meat processing subcategory (Subpart E), Alaskan whole crab and crab Section processing subcategory (Subpart F), dungeness and tanner crab processing in the contiguous States subcategory (Subpart G), Alaskan shrimp processing subcategory (Subpart H), Northern shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart I), Northern shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart J), Southern non-breaded shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart K), Southern non-breaded shrimp processing in the contiguous States of 1816 kg (4000lbs) or less of raw material per day subcategory (Subpart L), breaded shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory, Subpart M), breaded shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart N), and tuna processing subcategory (Subpart O) of the canned and preserved seafood processing subcategory of point sources.

Section 304(c) of the Act requires the Administrator to issue to the States and appropriate water pollution control agencies information on the processes, procedures or operating methods which result in the elimination or reduction of the discharge of pollutants to implement standards of performance under Section 306 of the Act. The Development Document referred to below provides, pursuant to section 304(c) of the Act, information on such processes, procedures or operating methods.

(b) Summary and basis of proposed effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources.

(1) General methodology.

The effluent limitations guidelines and standards of performance proposed herein were developed in the following manner. The point source category was first studied for the purpose of determining whether separate limitations and standards are appropriate for different segments within the category. This analysis included a determination of whether differences in raw material used, product produced, manufacturing process employed, age, size, geographic location, waste water constituents and other factors require development of separate limitations and standards for different segments of the point source category. The raw waste characteristics for each such segment were then identified. This included an analysis of (1) the source, flow and volume of water used in the process employed and the sources of waste and waste waters in the operation; and (2) the constituents of all waste water. The constituents of the waste waters which should be subject to effluent limitations guidelines and standards of performance were identified.

The control and treatment technologies existing within each segment were identified. This included an identification of each distinct control and treatment technology, including both in-plant and end-of-process technologies, which are existent or capable of being designed for each segment. It also included an identification of, in terms of the amount of constituents and the chemical, physical, and biological characteristics of pollutants, the effluent level resulting from the application of each of the technologies. The problems, limitations and reliability of each treatment and control technology were also identified. In addition, the non-water quality environmental impacts, such as the effects of the application of such technologies upon other pollution problems, including air, solid waste, noise and radiation were identified. The energy requirements of each control and treatment technology were determined as well as the cost of the application of such technologies.

The information, as outlined above, was then evaluated in order to determine what levels of technology constitute the "best practicable control technology currently available," "best available technology economically achievable" and the "best available demonstrated control technology, processes, operating methods, or other alternatives." In identifying such technologies, various factors were considered. These included the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements) and other factors.

The data on which the above analysis was performed included sampling data; consultant reports; EPA research, development, and demonstration grant projects; permit application data; the open literature; and other sources.

The pretreatment standards proposed herein are intended to be complementary to the pretreatment standards proposed for existing sources under Part 128 of 40 CFR. The basis for such standards is set forth in the FEDERAL REGISTER of July 19, 1973, 38 FR 19236. The provisions of Part 128 are equally applicable to sources which would constitute "new sources," under section 306 if they were to discharge pollutants directly to navigable waters except for § 128.133. That section provides a pretreatment standard for "incompatible pollutants" which requires application of the "best practicable control technology currently available," subject to an adjustment for amount of pollutants removed by the publicly owned treatment works. Since the pretreatment standards proposed herein apply to new sources, §§ 408.15, 408.25, 408.35, 408.45, 408.55, 408.65, 408.75, 408.85, 408.95, 408.105, 408.115, 408.125, 408.135, 408.145, and 408.155 below amend section 128.133 to require application of the standard of performance for new sources rather than the "best practicable" standard applicable to existing sources under sections 301 and 304(b) of the Act.

(2) Summary of conclusions with respect to the farm-raised catfish processing of more than 908 kg (2000 lbs) of raw material per day subcategory (Subpart A), farm-raised catfish processing of 908 kg (2000 lbs) or less of raw material per day subcategory (Subpart B), conventional blue crab processing subcategory (Subpart C), mechanized blue crab processing subcategory (Subpart D), Alaskan crab meat processing subcategory (Subpart E), Alaskan whole crab and crab section processing subcategory (Subpart F), dungeness and tanner crab processing in the contiguous States subcategory (Subpart G), Alaskan shrimp processing subcategory (Subpart H), Northern shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart I), Northern shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart J), Southern non-breaded shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart K), Southern non-breaded shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart L), breaded shrimp processing in the contiguous States of more than 1816 kg (4000 lbs) of raw material per day subcategory (Subpart M), breaded shrimp processing in the contiguous States of 1816 kg (4000 lbs) or less of raw material per day subcategory (Subpart N), and tuna processing subcategory (Subpart O) of the canned and preserved seafood processing category of point sources.

(i) Categorization.

For the purpose of studying waste treatment and effluent limitations, the farm-raised catfish, crab, shrimp and tuna segments of the canned and preserved seafood processing category were divided into fifteen discrete subcategories. Eleven were based primarily on a consideration of the variety of species being processed, manufacturing processes and subprocesses utilized, location of plant, and nature of operation (intermittent versus continuous) as outlined in the Development Document for the farm-raised catfish, crab, shrimp and tuna segments of the canned and preserved fish and seafood processing industry. Consideration of the economic impact of the proposed guidelines required an additional four subcategories based on the size of the processing facility. Different limitations were established for small plants within the farm-raised catfish, Northern shrimp, Southern non-breaded shrimp, and breaded shrimp segments of the industry due to unequal economic impacts created by diseconomies of scale.

(1) Subpart A—Farm-Raised Catfish Processing of More than 908 kg (2000 lbs) of Raw Material Per Day Subcategory: The farm-raised catfish processing industry is relatively new (many plants are

less than five years old) and employs processing techniques which are more homogeneous than most of the other segments of the seafood processing industry. The industry is concentrated principally in the Southern and Central United States.

(2) Subpart B—Farm-Raised Catfish Processing of 908 kg (2000 lbs) or Less of Raw Material Per Day Subcategory: Due to the disproportionate economic impact on the smaller farm-raised catfish processor, this subcategory adjusts the recommended guidelines to account for the diseconomies of scale in the application of waste treatment technology. With the exception of size, the description of Subpart B is identical to Subpart A.

(3) Subpart C—Conventional Blue Crab Processing Subcategory: Conventional blue crab processing plants, concentrated along the Gulf of Mexico and Atlantic coasts, are usually small operations utilizing manual picking of the crab meat. The waste water streams exhibit similar characteristics and low flow volumes. The majority of the pollutional load is attributable mainly to the cooking phase and to the plant clean up operation.

(4) Subpart D—Mechanized Blue Crab Processing Subcategory: Mechanized blue crab processing utilizes picking machines to separate the crab meat from the shell, a procedure which causes significant differences in waste water characteristics and volumes when compared to conventional blue crab processing. For example, the water use per kilogram of crab processed using mechanical pickers is 30 times the water use of the conventional process; the total suspended solids ratio is nearly 10 times greater; and the 5-day biochemical oxygen demand (BOD5) ratio approaches 4 times that of the conventional blue crab process.

(5) Subpart E—Alaskan Crab Meat Processing Subcategory: The Alaskan crab processing industry consists of a relativley small number of processing plants producing a large volume of product. The mechanical picking machines employed by Alaskan crab meat processors result in significantly different waste water characteristics and volumes when compared to the Alaskan whole crab and crab section process. For example, the crab meat process uses twice as much water as the whole crab and crab section process, and the 5-day biochemical oxygen demand and total suspended solids are almost 50 percent higher for the crab meat process.

(6) Subpart F—Alaskan Whole Crab and Crab Section Processing Subcategory: The whole crab and crab section process does not separate the meat from the shell before preservation. As discussed above, this processing technique results in significantly different waste water characteristics and volumes when compared to the Alaskan crab meat process.

(7) Subpart G—Dungeness and Tanner Crab Processing in the Contiguous States Subcategory: Dungeness and tanner crab processing plants in the contiguous States are relatively small compared to Alaskan plants. Unlike Alaskan processing, the plants utilise manual picking for crab meat production. Moreover, geographical differences based on considerations of climate, topography, relative isolation of the processing plants in Alaska, land and water availability and soil conditions further justify a distinction between Alaskan processing and processing in the contiguous States.

(8) Subpart H—Alaskan Shrimp Processing Subcategory: The Alaskan shrimp processing industry is similar to the Northern shrimp processing industry in the contiguous States in terms of processing technology and waste water characteristics. However, geographical differences such as those listed in the previous section justify a distinction between Alaskan processing and processing in the contiguous States.

(9) Subpart I—Northern Shrimp Processing of More Than 1816 kg (4000 lbs) of Raw Material Per Day in the Contiguous States Subcategory: The Northern shrimp processing industry in the contiguous States includes the New England and Pacific Northwest as well as the California shrimp processors. Significant differences in waste water characteristics exist between this subcategory and the Southern non-breaded shrimp and breaded shrimp subcategories. For example, the settleable solids in the waste waters from Northren shrimp processors were nearly ten times those from Southern non-breaded and breaded shrimp processing. The Northern shrimp 5-day biochemical oxygen demand was nearly three times that of the Southern non-breaded shrimp and 1.4 times that of the breaded shrimp, a phenomenon largely attributable to the differences in product size. Paralleling this BOD5 relationship, the Northern shrimps' grease and oil level was also higher than those levels of the Southern non-breaded and breaded shrimp.

(10) Subpart J—Northern Shrimp Processing in the Continguous States of 1816 kg (4000 lbs) or Less of Raw Material Per Day Subcategory: Due to the disproportionate economic impact on the smaller Northern shrimp processor, this subcategory adjusts the recommended guidelines to account for the diseconomies of scale in the application of waste treatment technology. With the exception of size, the description of Subpart J is identical to Subpart I.

(11) Subpart K—Southern Non-Breaded Shrimp Processing of More Than 1816 kg (4000 lbs) of Raw Material Per Day in the Contiguous States Subcategory: Southern shrimp processing, concentrated in the Gulf of Mexico and South Atlantic areas, utilizes a larger species of shrimp than either the Alaskan or Northern shrimp processing industries. This difference in raw material processed is responsible for the significant differences in waste water characteristics as described in section 9. Moreover, the BCD5 and water consumption for Southern non-breaded shrimp are almost half of that for breaded shrimp.

(12) Subpart L—Southern Non-Breaded Shrimp Processing in the contiguous States of 1816 kg (4000 lbs) or Less of Raw Material Per Day Subcategory: Due to the disproportionate economic impact on the smaller Southern non-breaded shrimp processor, this subcategory adjusts the recommended guidelines to account for the diseconomies of scale in the application of waste treatment technology. With the exception of size, the description of subpart L is identical to Subpart K.

(13) Subpart M—Breaded Shrimp Processing of more than 1816 kg (4000 lbs) of Raw Material Per Day in the Contiguous States Subcategory: The addition of a breading operation to the processing of shrimp causes significant increases in certain waste water parameters such as biochemical oxygen demand and total suspended solids as previously discussed in Subparts I and K above.

(14) Subpart N—Breaded Shrimp Processing in the Contiguous States of 1816 kg (4000 lbs) or Less of Raw Material Per Day Subcategory: Due to the disproportionate economic impact on the smaller breaded shrimp processor, this subcategory adjusts the recommended guidelines to account for the diseconomies of scale in the application of waste treatment technology. With the exception of size, the description of subpart N is identical to subpart M.

(15) Subpart O—Tuna Processing Subcategory: Although widely distributed geographically, the tuna processing industry utilizes a common technology for the production of canned tuna and various by-products. Waste water characteristics are thus fairly uniform from region to region regardless of plant size. The tuna processing industry is the only segment of the seafood processing industry examined in the Development Document which has a relatively continuous year-round operation.

(ii) Waste characteristics.

Pollutants contained in waste waters resulting from seafood processing are measured by biochemical oxygen demand, chemical oxygen demand, settleable solids, total suspended solids, oil and grease, total Kjeldahl nitrogen (organic nitrogen and ammonia), nitrate, phosphorus, oil and grease, coliform bacteria, pH and temperature. Of the foregoing pollution parameters, biochemical oxygen demand, total suspended solids, and oil and grease have been selected as significant parameters for the establishment of effluent limitations. The pH parameter is included also as an effluent limitation which must fall within an acceptable range of values. The remaining parameters are so closely related to those selected as to be influenced by their limitations, or present at levels that are not significant.

(iii) Origin of waste water pollutants in the canned and preserved seafood processing category.

Generally, waste water flows within the seafood processing industry originate at the receiving, preprocessing, evisceration, pre-cooking, picking and cleaning, preserving, canning, freezing, plant cleanup and by-product operations of the manufacturing process.

(iv) Treatment and control technology.

Present control and treatment practices are uniformly inadequate within the farm-raised catfish, crab, shrimp and tuna processing segments of the canned and preserved seafood processing industry. Processors employ few if any waste water treatment facilities at the full scale plant operational level. Consequently, with the exception of screening and solids recovery, the majority of the waste water treatment alternatives are based on pilot plant studies, transferable technology from the meat processing industry, municipal waste treatment systems, or other segments of the seafood as well as the food processing industry.

The available alternatives include in-plant controls such as water conservation and dry capture of solids to minimize raw waste loads from processing. The end-of-process physical and chemical treatment technologies include screening, sedimentation, air flotation, and concentration. The end-of-process biological treatment alternatives include activated sludge, extended aeration, rotating biological contactors, high-rate trickling filters, stabilization ponds, and aerated lagoons.

(v) Treatment and control technology within subcategories. Waste water treatment and control technologies have been studied for each subcategory of the industry to determine what is (a) the best practicable control technology currently available, (b) the best available technology economically achievable, and (c) the best available demonstrated control technology, processes, operating methods or other alternatives.

(1) Treatment for the farm-raised catfish processing of more than 908 kg (2000 lbs) of raw material per day subcategory: The best practicable control technology currently available involves efficient in-plant water and waste water management, partial recycle of live fish holding tank water, solids or by-product recovery, and aerated lagoons and oxidation ponds. The best available technology economically achievable includes effluent treatment through an extended aeration system. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources is based on spray irrigation of process waste water and partial recycle of live fish holding tank water with overflow and discharge to fish holding ponds which occasionally overflow to navigable waters.

(2) Treatment for the farm-raised catfish processing of 908 kg (2000 lbs) or less of raw material per day subcategory: The best practicable control technology currently available involves efficient in-plant water and waste water management, partial recycle of live fish holding tank water, solids, or by-product recovery, and oxidation ponds. The best available technology economically achievable includes effluent treatment through an extended aeration system. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are based on spray irrigation of process waste water and partial recycle of live fish holding tank water with overflow and discharge to fish holding ponds which occasionally overflow to navigable waters.

(3) Treatment for the conventional blue crab processing subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management, solids or by-product recovery, and aerated lagoon systems. The best available technology economically achievable includes effluent treatment through an extended aeration system. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are met by the requirements for the best practicable control technology currently available.

(4) Treatment for the mechanized blue crab processing subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management, solids or by-product recovery, and aerated lagoon systems. The best available technology economically achievable includes effluent treatment through an extended aeration system. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are met by the requirements for the best practicable control technology currently available and appropriate process design to provide more efficient water and waste water management.

(5) Treatment for the Alaskan crab meat processing subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management, by-product recovery or ultimate disposal of solids, and screening of the waste water effluent. The unique physical situation of Alaskan processors includes extreme seasonality, harsh climate and frequent inavailability of usable land. This precludes consideration of more sophisticated waste-management technologies which are readily transferable to seafood processing in the contiguous States. The best available technology economically achievable includes treatment by dissolved air flotation systems. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are met by the requirements for the best practicable control technology currently available and appropriate process design to provide more efficient water and waste water management.

(6) Treatment for the Alaskan whole crab and crab section processing subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management, by-product recovery or ultimate disposal of solids, and screening of the waste water effluent. As discussed in the previous section, the unique physical situation of Alaskan processors precludes consideration of more sophisticated waste-management technologies which are readily transferable to seafood processing in the contiguous States. The best available technology economically achievable includes treatment by dissolved air flotation systems. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are met by the requirements for the best practicable control technology currently available and appropriate process design to provide more efficient water and waste water management.

(7) Treatment for the dungeness and tanner crab processing in the contiguous States subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management, solids or by-product recovery techniques, and dissolved air flotation systems. The best available technology economically achievable includes treatment by aerated lagoon systems in addition to dissolved air flotation systems with chemical coagulation. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are met by the requirements for the best practicable control technology currently available and appropriate process design to provide more efficient water and waste water management.

(8) Treatment for the Alaskan shrimp processing subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management, by-product recovery or ultimate disposal of solids, and screening of the waste water effluent. As discussed previously in sections (5) and (6) above, the unique physical situation of Alaskan processors precludes consideration of more sophisticated waste-management technologies which are readily transferable to seafood processing in the contiguous States. The best available technology economically achievable includes treatment by dissolved air flotation systems. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are met by the requirements for the best practicable control technology currently available and appropriate process design to provide more efficient water and waste water management.

(9) Treatment for the Northern shrimp processing of more than 1816 kg (4000 lbs) of raw material per day in the contiguous States subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management, solids or by-product recovery techniques, and dissolved air flotation

systems. The best available technology economically achievable includes treatment by aerated lagoon systems in addition to dissolved air flotation systems with chemical coagulation. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are met by the requirements for the best practicable control technology currently available and appropriate process design to provide more efficient water and waste water management.

(10) Treatment for the Northern shrimp processing of 1816 kg (4000 lbs) or less of raw material per day in the contiguous States subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management and solids or by-product recovery through the use of screening systems. The best available technology economically achievable includes treatment by dissolved air flotation systems in addition to screening. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources is based on dissolved air flotation systems in addition to screening and appropriate process design to provide more efficient water and waste water management.

(11) Treatment for the Southern non-breaded shrimp processing of more than 1816 kg (4000 lbs) of raw material per day in the contiguous States subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management, solids or by-product recovery techniques, and dissolved air flotation systems. The best available technology economically achievable includes treatment by aerated lagoon systems in addition to dissolved air flotation systems with chemical coagulation. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are met by the requirements for the best practicable control technology currently available and appropriate process design to provide more efficient water and waste water management.

(12) Treatment for the Southern non-breaded shrimp processing of 1816 kg (4000 lbs) or less of raw material per day in the contiguous States subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management and solids or by-products recovery through the use of screening systems. The best available technology economically achievable includes treatment by dissolved air flotation systems in addition to screening. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are based on dissolved air flotation systems in addition to screening and appropriate process design to provide more efficient water and waste water management.

(13) Treatment for the breaded shrimp processing of more than 1816 kg (4000 lbs) or raw material per day in the contiguous States subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management, solids or by-product recovery techniques, and dissolved air flotation systems. The best available technology economically achievable includes treatment by aerated lagoon systems in addition to dissolved air flotation systems with chemical coagulation. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are met by the requirements for the best practicable control technology currently available and appropriate process design to provide more efficient water and waste water management.

(14) Treatment for the breaded shrimp processing of 1816 kg (4000 lbs) or less of raw material per day in the contiguous States subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management and solids or by-product recovery through the use of screening systems. The best available technology economically achievable includes treatment by dissolved air flotation systems in addition to screening. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are based on dissolved air flotation systems in addition to screening and appropriate process design to provide more efficient water and waste water management.

(15) Treatment for the tuna processing subcategory: The best practicable control technology currently available consists of efficient in-plant water and waste water management, solids and by-product recovery techniques, and dissolved air flotation systems. The best available technology economically achievable includes dissolved air flotation systems with chemical addition, high rate trickling filters followed by activated sludge biological treatment systems. The best available demonstrated control technology, processes, operating methods or other alternatives for new sources are met by the requirements for the best practicable control technology currently available and appropriate process design to provide more efficient water and waste water management.

(vi) Establishing daily maximum limitations: Because there are no existing waste water treatment facilities at the plant level, the 30-day and the daily maximum limitations are based on engineering judgment and the consideration of the operating characteristics of similar treatment systems within the meat processing industry, municipal waste treatment systems, or other segments of the seafood as well as the food processing industry. The daily maximum limitations for the screening systems are 3 times the thirty day limitations; for air flotation systems, 2.5 times the thirty day limitation; for aerated lagoon systems, 2 times the thirty day limitation; for extended aeration systems, 3 times the thirty day limitation; and for activated sludge systems, 3.5 times the thirty day limitation. An exception was made for the total suspended solids after screening in the Alaskan shrimp processing subcategory due to the high initial level of the parameter. The daily maximum limitation of total suspended solids for the Alaskan shrimp processing subcategory is 1.5 times the 30 day limitation.

The proposed effluent limitations guidelines and standards of performance are expressed in terms of a ratio between the weight of pollutants which may be discharged and the weight of raw material, i.e., fish and seafood processed.

When a plant is subject to effluent limitations covering more than one subcategory, the plant's effluent limitation shall be the aggregate of the limitations applicable to the total production covered by each subcategory.

(vii) The cost and energy requirements associated with the control and treatment technologies have been considered. The costs for in-plant controls are largely those associated with capital investment for process and equipment modifications. Realization of values obtained from product loss reduction, by-product recovery, and reduced treatment costs may well result in a net gain. For example, in 1973 fish meal supplies are selling up to three or more times the 1971 prices. Peru, normally the producer of one-half of the world's fish meal, has had greatly reduced output in 1972 and 1973. Hence if this trend continues, the production of meal from waste will be economically profitable for many plants.

The costs associated with end-of-pipe treatment include amortization of capital expenditures over a ten-year period, debt servicing, and operation and maintenance. Added energy requirements are those associated with operation of treatment facilities and constitute only a small fraction of the total plant consumption.

(viii) Economic impact analysis.

A precise study of the economic impact is difficult due to numerous other forces at work within the seafood industry, and because of the plant-to-plant variability of such factors as pollution control costs, profitability, and return on investment.

There may be a significant economic impact due to diseconomies of scale within the catfish, Northern shrimp, Southern non-breaded shrimp, and breaded shrimp segments of the industry. Because of this, four proposed subcategories are based on economic considerations alone in order to alleviate the plight of the smaller processor. The determination of the subdivision for smaller processors is based on limited information and is subject to revision before promulgation in final form of the proposed effluent limitations guidelines.

The report entitled "Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Catfish, Crab, Shrimp, and Tuna segments of the Canned and Preserved Fish and Seafood Processing Industry" details the analysis undertaken in support of the regulations proposed herein. The report is available for inspection in the EPA Information Center, Room 227, West Tower, Waterside Mall, Washington, D.C., at all EPA regional offices, and at State water pollution control offices. A supplementary analysis prepared for EPA of the possible economic effects of the proposed regulations is also available for inspection at these locations. Copies of both of these documents are being sent to persons or institutions affected by the proposed regulations, or who have placed themselves on a mailing list for this purpose (see EPA's Advance Notice of Public Review Procedures, 38 FR 21202, August 6, 1973). An additional limited number of copies of both reports are available. Persons wishing to obtain a copy may write the EPA Information Center, Environmental Protection Agency, Washington, D.C. 20460, Attention: Mr. Philip B. Wisman.

On June 14, 1973, the Agency published procedures designed to insure that, when certain major standards, regulations, and guidelines are proposed, an explanation of their basis, purpose and environmental effects is made available to the public (38 FR 15653). The procedures are applicable to major standards, regulations and guidelines which are proposed on or after December 31, 1973, and which prescribe national standards of environmental quality or require national emission, effluent or performance standards and limitations.

The Agency determined to implement these procedures in order to insure that the public was apprised of the environmental effects of its major standards setting actions and was provided with detailed background information to assist it in commenting on the merits of a proposed action. In brief, the procedures call for the Agency to make public the information available to it delineating the major nonenvironmental factors affecting the decision, and to explain the viable options available to it and the reasons for the option selected.

The procedures contemplate publication of this information in the FEDERAL REGISTER, where this is practicable. They provide, however, that where, because of the length of these materials, such publication is impracticable, the material may be made available in an alternate format.

The report entitled "Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Catfish, Crab, Shrimp, and Tuna Segments of the Canned and Preserved Seafood Processing Industry Point Source Category" contains information available to the Agency concerning the major environmental effects of the regulation proposed below, including:

(1) the pollutants presently discharged into the Nation's waterways by processors of canned and preserved seafood and the degree of pollution reduction obtainable from the implementation of the proposed guidelines and standards (see particularly sections IV, V, VI, IX, X, and XII);

(2) the anticipated effects of the proposed regulation on other aspects of the environment including air, solid waste disposal and land use, and noise (see particularly section VIII); and

(3) options available to the Agency in developing the proposed regulatory system and the reasons for its selecting the particular levels of effluent reduction which are proposed (see particularly sections VI, VII, and VIII).

The supplementary report entitled "Economic Analysis of Proposed Effluent Guidelines Seafoods Processing Industry" contains an estimate of the cost of pollution control requirements and an analysis of the possible effects of the proposed regulations on prices, production levels, employment, communities in which canned and preserved seafood processing plants are located, and international trade. In addition, the above described Development Document describes, in section VIII, the cost and energy consumption implications of the proposed regulations.

The two reports described above in the aggregate exceed 500 pages in length and contain a substantial number of charts, diagrams, and tables. It is clearly impracticable to publish the material contained in these documents in the FEDERAL REGISTER. To the extent possible, significant aspects of the material have been presented in summary form in foregoing portions of this preamble. Additional discussion is contained in the following analysis of comments received and the Agency's response to them. As has been indicated, both documents are available for inspection at the Agency's Washington, D.C. and regional offices and at State water pollution control agency offices. Copies of each have been distributed to persons and institutions affected by the proposed regulations or who have placed themselves on a mailing list for this purpose. Finally, so long as the supply remains available, additional copies may be obtained from the Agency as described above.

When regulations for the processors of canned and preserved seafood are promulgated in final form, revised copies of the Development Document will be available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Copies of the Economic Analysis will be available through the National Technical Information Service, Springfield, Virginia 22151.

(2) Summary of Public Participation. Prior to this publication, the agencies and groups listed below were consulted and given an opportunity to participate in the development of effluent limitations guidelines and standards proposed for the canned and preserved fish and seafood processing category. All participating agencies and groups have been informed of project developments. An initial draft of the Development Document was sent to all participants and comments were solicited on that report. The following are the principal agencies and groups consulted: (1) Effluent Standards and Water Quality Information Advisory Committee (established under section 515 of the Act); (2) all State and U.S. Territory Pollution Control Agencies; (3) the National Marine Fisheries Service, U.S. Department of Commerce; (4) U.S. Department of the Interior; (5) U.S. Department of Health, Education, and Welfare; (6) the Water Resources Council; (7) the American Society of Mechanical Engineers; (8) Hudson River Sloop Restoration, Inc.; (9) the Conservation Foundation; (10) Environmental Defense Fund, Inc.; (11) Natural Resources Defense Council; (12) the American Society of Civil Engineers; (13) the Water Pollution Control Federation; (14) the National Wildlife Federation; (15) the American Frozen Food Institute; (16) the National Canners Association; (17) the National Fisheries Association; (18) the Catfish Farmers of America; (19) the American Shrimp Canners Association; (20) Tuna Research Foundation, Inc.; (21) the Chesapeake Bay Seafood Industries Association; and (22) the Kodiak Seafood Processors Association.

The following organizations responded with comments: National Canners Association; American Shrimp Canners Association; Catfish Farmers of America; Chesapeake Bay Seafood Industries Association; Kodiak Seafood Processors Association; American Society of Civil Engineers; National Marine Fisheries Service, U.S. Department of Commerce; State of Georgia, Department of Natural Resources; State of Alaska, Department of Environmental Conservation; Government of American Samoa, Environmental Quality Commission; and the California Water Resources Control Board.

The comments were highly variable, ranging from full approval to total rejection of the conclusions and recommendations contained in the draft Development Document.

The primary issues raised in the development of the proposed effluent limitations guidelines and standards of performance and the treatment of these issues herein are as follows:

(a) A number of commentors questioned the validity of the sampling method of screening the raw waste waters with a 20-mesh Tyler sieve prior to laboratory analysis. They contended that the data contained in the Development Document are in reality screened waste loads and may not be used as a valid base for establishing further reductions through employment of subsequent waste water treatment under commercial plant operating conditions.

Immediately after sampling, each aliquot was passed through a standard 20-mesh Tyler screen prior to adding it to the composite sample. This practice has been used in previous waste water characterization research in both the seafoods and the fruits and vegetable fields. It serves to remove the larger solid particles (such as crab legs, some shrimp shell, fish parts, etc.) and thereby greatly reduce the resultant "scatter" of the data points. The method is especially valuable in developing a precise base-line value for each parameter from a limited number of samples.

The alternatives to this approach were to use a larger mesh size, to blend or grind the samples, or to leave all solids intact and in the sample. A larger mesh size would have been less defensible than 20-mesh, since the latter represented the minimum mesh expected to be encountered in full scale treatment designs. To grind the samples would have led to unrealistically high values for some parameters such as BOD5 and grease and oil, because these values are surface-area dependent. Grinding a food processing waste sample can increase its BOD5 by up to 1000 percent. This choice was rejected because the values obtained through this method (especially those for BOD5—the simple most important parameter in the guidelines) would be unrealistically high. The third alternative was not adopted because it would introduce unacceptable scatter into the results and cast serious doubt on the validity of the parameter averages obtained.

It was recognised that laboratory screening efficiencies would likely be higher than full-scale field screening efficiencies (for the same mesh). However, the same or better results could be obtained by using smaller mesh sizes in full-scale plant application.

Adoption of the 20-mesh screening method provided accurate, reliable baseline data for each parameter in each subcategory for screened waste water, thereby permitting confident selection of subsequent treatment alternatives.

For estimates of removal efficiencies for the design and cost estimates, the literature was consulted to establish the relationship between screened and unscreened BOD5 for each subcategory. This factor was applied in full recognition of the inherent inaccuracies associated with the "unscreened" value.

(b) The criticism was made that limitations on Kjeldahl nitrogen were unnecessary because nitrogen levels vary with the solids and BOD levels.

Nitrogen parameters are not included in the proposed effluent limitations guidelines because the extent to which nitrogen components in fish and seafood wastes is removed by physical-chemical or biological treatment, remains to be evaluated. Furthermore, the need for advanced treatment technology specifically designed for nitrogen removal has not been demonstrated at this time for this industry.

(c) A common criticism stated that the data base justifying the subcategorization of the industry and the effluent guidelines is insufficient. The Environmental Protection Agency recognises that prior to this study a paucity of reliable waste characterization data describing the farm-raised catfish, crab, shrimp, and tuna processing industries existed. The statutory time constraints precluded the collection of exhaustive data covering all possible processing configurations and complete seasonal cycles. Therefore, the data generated for the study with the accompanying assumptions are presented in the Development Document. Furthermore, a major objective of the study was to determine whether "Best Practicable Control Technology" existed within the industry, and if not, to "transfer technology" which is readily available for waste treatment.

The Federal Water Pollution Control Act Amendments of 1972 provide for periodic review of the guidelines in order to consider additional data as well as processing and waste treatment innovations.

(d) The criticism has been made that a substantial number of processors do not have access to adequate land for the construction of waste treatment facilities.

With the exception of the catfish and conventional and mechanised blue crab subcategories, achieving the effluent limitations proposed for the best practicable control technology currently available requires only a minimal amount of land. The next lower level of treatment is screening or no treatment. The catfish processors are located inland in relatively flat areas where land is generally available. Also, some catfish processing plants are located in or near urban areas which provides access to existing domestic sewerage and treatment systems. The blue crab processors usually are located in areas with flat land available for waste treatment plant construction. These processors, too, are often near urban areas which provides access to existing domestic sewerage and treatment systems.

With the exception of crab and shrimp processing in Alaska the limitations based on best available technology economically achievable are dependent upon the availability of some land. It is recognised that land may not be available to many processors. However, the proposed limitations do not dictate which technology to employ. In the interim before July 1, 1983, improved product and by-product recovery techniques, with improved physical and chemical treatment, could provide an effluent which meets the limitations. Therefore, a non-land requiring technology may be utilised, if available, to meet the requirements proposed for best available technology economically achievable.

(e) Economic impact.

Many comments have indicated that the costs associated with meeting the proposed effluent limitations guidelines will close large segments of the seafood industry.

There may be a significant economic impact on some segments of the industry such as catfish and shrimp processors for Level I. The costs of meeting the proposed Level II guidelines may cause a relatively larger impact. As discussed previously, four subcategories were developed to alleviate the impact on the smaller processor due to diseconomies of scale. In addition, due to the conservative nature of the cost estimates for control and treatment equipment, the actual impact on the industry should be less than that indicated by the economic impact analysis.

In all cases the design and cost estimates assumed a two shift per day operation at full plant capacity for each shift for the hydraulic loading of the model treatment systems. Comments from industry such as the catfish processors' indicate that the majority of plants normally operate at a fraction of rated capacity.

The cost estimates assumed that no treatment existed at the plant level which is an accurate assessment for the majority of the processors in Alaska but not for processors in the contiguous States. Most of the processors outside of Alaska employ some form of screening to remove solids from the plant effluent streams.

In many instances improved product and by-product recovery produces increased revenues for the processing plant. However, the possible income resulting from these effluent control measures was not included in the economic impact analysis.

The economic impact analysis did not consider the availability of funds to small businesses under section 7 of the Small Business Act, 15 U.S.C. 636. Section 8 of Pub. L. 92-500 amends the Small Business Act to authorize loans for assisting small business concerns in adding to or altering their equipment, facilities or methods of operation in order to meet water pollution control requirements. Additional funds are available for this purpose and should ease the problem of raising capital for small businesses.

Section 301(c) of the Act provides for modification of the effluent limitations guidelines with respect to any point source which is based on the best available technology economically achievable, upon a showing by the owner or operator of such point source satisfactory to the Administrator that such modified requirements (1) will represent the maximum use of technology within the economic capability of the owner or operator; and (2) will result in reasonable further progress toward the elimination of the discharge of pollutants.

In developing the proposed guidelines, difficulty was experienced in obtaining sufficient information and data on which to base a full and quantitative evaluation of the economic impact. The information and data available show that there will be greater economic impact on very small processors than on the rest of the industry. More information is desired, particularly on the small processor, to enable a fuller assessment of the overall impact with respect to plant closings, employment, and on local communities. Information and data are specifically requested for the following: (i) Plant revenues, (ii) Production costs, (iii) Production yields, (iv) Profits, (v) Return on investments, (vi) Pollution control costs, (vii) The level of capacity utilization for different size plants and the ability of plants to expand to a level where economies of scale can be realized; and (viii) Access to municipal disposal systems (both waste water and solids) together with the availability and costs of land for land-based disposal techniques. Information and data are also solicited in regard to the treatment effectiveness resulting from dissolved air flotation treatment of tuna, crab, and shrimp processing waste or similar wastes.

Interested persons may participate in this rulemaking by submitting written comments in triplicate to the EPA Information Center, Environmental Protection Agency, Washington, D.C. 20460, Attention: Mr. Philip B. Wisman. Comments on all aspects of the proposed regulations are solicited. In the event comments are in the nature of criticisms as to the adequacy of data which is available, or which may be relied upon by the Agency, comments should identify and, if possible, provide any additional data which may be available and should indicate why such data is essential to the development of the regulations. In the event comments address the approach taken by the Agency in establishing an effluent limitation guideline or standard of performance, EPA solicits suggestions as to what alternative approach should be taken and why and how this alternative better satisfies the detailed requirements of sections 301, 304(b), 306 and 307 of the Act.

A copy of all public comments will be available for inspection and copying at the EPA Information Center, Room 227, West Tower, Waterside Mall, 401 M Street, SW., Washington, D.C. A copy of preliminary draft contractor reports, the Development Document and economic study referred to above and certain supplementary materials supporting the study of the industry concerned will also be maintained at this location for public review and copying. The EPA information regulation, 40 CFR Part 2, provides that a reasonable fee may be charged for copying.

All comments received within thirty days of publication of this notice in the FEDERAL REGISTER will be considered. Steps previously taken by the Environmental Protection Agency to facilitate public response within this time period are outlined in the advance notice concerning public review procedures published on August 6, 1973 (38 FR 21202).

Dated: January 25, 1974.

JOHN QUARLES,
Acting Administrator.

PART 408—EFFLUENT LIMITATIONS GUIDELINES FOR EXISTING SOURCES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR NEW SOURCES FOR THE CANNED AND PRESERVED SEAFOOD PROCESSING POINT SOURCE CATEGORY

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408.110 Applicability; description of the Southern non-breaded shrimp processing of more than 1816 kg (4000 lbs) of raw material per day in the contiguous States subcategory.
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408.140 Applicability; description of the breaded shrimp processing of 1816 kg (4000 lbs) or less of raw material per day in the contiguous States subcategory.
408.141 Specialized definitions.
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408.150 Applicability; description of the tuna processing subcategory.
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Subpart A—Farm-Raised Catfish Processing of More Than 908 kg (2000 lbs) of Raw Material Per Day

§ 408.10 Applicability; description of the farm-raised catfish processing of more than 908 kg (2000 lbs) of raw material per day subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of farm-raised catfish by facilities which process more than 908 kg (2000 lbs) of raw material per day on any day during a calendar year.

§ 408.11 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.12 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 4.6 kg/kkg of seafood (4.6 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 2.3 kg/kkg of seafood (2.3 lb/1,000 lb).
TSS	Maximum for any 1 day: 11.4 kg/kkg of seafood (11.4 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 5.7 kg/kkg of seafood (5.7 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.90 kg/kkg of seafood (0.90 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 0.45 kg/kkg of seafood (0.45 lb/1,000 lb)
pH	Within the range of 6.0 to 9.0.

§ 408.13 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 4.2 kg/kkg of seafood (4.2 lb/1,000 lb).
	Maximum average of daily value for any period of 30 consecutive days: 1.4 kg/kkg of seafood (1.4 lb/1,000 lb).
TSS	Maximum for any 1 day: 4.2 kg/kkg of seafood (4.2 lb/1,000 lb).
	Maximum average of daily value for any period of 30 consecutive days: 1.4 kg/kkg of seafood (1.4 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 1.4 kg/kkg of seafood (1.4 lb/1,000 lb).
	Maximum average of daily values for any period of [illegible] consecutive days: 0.45 kg/kkg of seafood (0.45 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.14 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants at a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5.........	Maximum for any 1 day: 0.20 kg/kkg of seafood (0.20 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 0.10 kg/kkg of seafood (0.10 lb/1,000 lb).
TSS..........	Maximum for any 1 day: 0.40 kg/kkg of seafood (0.40 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 0.20 kg/kkg of seafood (0.20 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.20 kg/kkg of seafood (0.20 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 0.10 kg/kkg of seafood (0.10 lb/1,000 lb).
pH...........	Within the range of 6.0 to 9.0.

§ 408.15 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the farm-raised catfish processing of more than 908 kg (2000 lb) of raw material per day subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128, of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows:

"In addition to the prohibitions set forth in section 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.14, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart B—Farm-Raised Catfish Processing of 908 kg (2000 lbs) or Less of Raw Material Per Day Subcategory

§ 408.20 Applicability; description of the farm-raised catfish processing of 908 kg (2000 lbs) or less of raw material per day subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of farm-raised catfish by facilities which process 908 kg (2000 lbs) or less of raw material per day.

§ 408.21 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.22 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5........	Maximum for any 1 day: 4.6 kg/kkg of seafood (4.6 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 2.3 kg/kkg of seafood (2.3 lb/1,000 lb).
TSS..........	Maximum for any 1 day: 11.4 kg/kkg of seafood (11.4 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 5.7 kg/kkg of seafood (5.7 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.90 kg/kkg of seafood (0.90 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 0.45 kg/kkg of seafood (0.45 lb/1,000 lb).
pH............	Within the range of 6.0 to 9.0.

§ 408.23 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5........	Maximum for any 1 day: 4.2 kg/kkg of seafood (4.2 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 1.4 kg/kkg of seafood (1.4 lb/1,000 lb).
TSS..........	Maximum for any 1 day: 4.2 kg/kkg of seafood (4.2 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 1.4 kg/kkg of seafood (1.4 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 1.4 kg/kkg of seafood (1.4 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 0.45 kg/kkg of seafood (0.45 lb/1,000 lb).
pH............	Within the range of 6.0 to 9.0.

§ 408.24 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 0.20 kg/kkg of seafood (0.20 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.10 kg/kkg of seafood (0.10 lb/1,000 lb).
TSS	Maximum for any 1 day: 0.40 kg/kkg of seafood (0.40 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.20 kg/kkg of seafood (0.20 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.20 kg/kkg of seafood (0.20 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.10 kg/kkg of seafood (0.10 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.25 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the farm-raised catfish processing of 908 (kg (2000 lbs) or less of raw material per day subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.24, 40 CFR, Part 408: *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart C—Conventional Blue Crab Processing Subcategory

§ 408.30 Applicability; description of the conventional blue crab processing subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of blue crab in which manual picking or separation of crab meat from the shell is utilized.

§ 408.31 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oyxgen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.32 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 0.30 kg/kkg of seafood (0.30 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.15 kg/kkg of seafood (0.15 lb/1,000 lb).
TSS	Maximum for any one day: 0.90- kg/kkg of seafood (0.90 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.45 kg/kkg of seafood (0.45 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.13 kg/kkg of seafood (0.13 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.065 kg/kkg of seafood (0.065 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.33 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 0.36 kg/kkg of seafood (0.36 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.12 kg/kkg of seafood (0.12 lb/1,000 lb).
TSS	Maximum for any 1 day: 0.36 kg/kkg of seafood (0.36 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.12 kg/kkg of seafood (0.12 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.078 kg/kkg of seafood (0.078 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.026 kg/kkg of seafood (0.026 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.34 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 0.30 kg/kkg of seafood (0.30 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.15 kg/kkg of seafood (0.15 lb/1,000 lb).
TSS	Maximum for any 1 day: 0.90 kg/kkg of seafood (0.90 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.45 kg/kkg of seafood (0.45 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.13 kg/kkg of seafood (0.13 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.065 kg/kkg of seafood (0.065 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.35 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the conventional blue crab processing subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.34, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart D—Mechanized Blue Crab Processing Subcategory

§ 408.40 Applicability; description of the mechanized blue crab processing subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of blue crab in which mechanical picking or separation of crab meat from the shell is utilized.

§ 408.41 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.42 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 6.0 kg/kkg of seafood (6.0 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 3.0 kg/kkg of seafood (3.0 lb/1,000 lb).
TSS	Maximum for any 1 day: 15 kg/kkg of seafood (15 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 7.4 kg/kkg of seafood (7.4 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 2.8 kg/kkg of seafood (2.8 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 1.4 kg/kkg of seafood (1.4 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.43 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 5.7 kg/kkg of seafood (5.7 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 1.9 kg/kkg of seafood (1.9 lb/1,000 lb).
TSS	Maximum for any 1 day: 5.7 kg/kkg of seafood (5.7 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 1.9 kg/kkg of seafood (1.9 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 1.6 kg/kkg of seafood (1.6 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.53 kg/kkg of seafood (0.53 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.44 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 5.0 kg/kkg of seafood (5.0 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 2.5 kg/kkg of seafood (2.5 lb/1,000 lb).
TSS	Maximum for any 1 day: 13 kg/kkg of seafood (13 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 6.3 kg/kkg of seafood (6.3 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 2.6 kg/kkg of seafood (2.6 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 1.3 kg/kkg of seafood (1.3 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.45 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the mechanized blue crab processing subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standards for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.44, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart E—Alaskan Crab Meat Processing Subcategory

§ 408.50 Applicability; description of the Alaskan crab meat processing subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing, in Alaska, of dungeness, tanner, and king crab meat.

§ 408.51 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.52 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 29 kg/kkg of seafood (29 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 9.6 kg/kkg of seafood (9.6 lb/1,000 lb).
TSS	Maximum for any 1 day: 19 kg/kkg of seafood (19 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 6.2 kg/kkg of seafood (6.2 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 1.8 kg/kkg of seafood (1.8 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 0.61 kg/kkg of seafood (0.61 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.53 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 12 kg/kkg of seafood (12 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 4.9 kg/kkg of seafood (4.9 lb/1,000 lb).
TSS	Maximum for any 1 day: 4.0 kg/kkg of seafood (4.0 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 1.6 kg/kkg of seafood (1.6 lb/1,000 lb).
Oil and Grease.	Maximum for any 1 day: 0.25 kg/kkg of seafood (0.25 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 0.10 kg/kkg of seafood (0.10 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.54 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 25 kg/kkg of seafood (25 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 8.2 kg/kkg of seafood (8.2 lb/1,000 lb).
TSS	Maximum for any 1 day: 16 kg/kkg of seafood (16 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 5.8 kg/kkg of seafood (5.8 lb/1,000 lb).
Oil and Grease.	Maximum for any 1 day: 1.6 kg/kkg of seafood (1.6 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 0.58 kg/kkg of seafood (0.58 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.55 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the Alaskan crab meat processing subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows:

> "In addition to the prohibitions set forth in § 128.131; the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.54, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart F—Alaskan Whole Crab and Crab Section Processing Subcategory

§ 408.60 Applicability; description of the Alaskan whole crab and crab section processing subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing, in Alaska, of dungeness, tanner and king whole crab and crab sections.

§ 408.61 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.62 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 18 kg/kkg of seafood (18 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 6.0 kg/kkg of seafood (6.0 lb/1,000 lb).
TSS	Maximum for any 1 day: 12 kg/kkg of seafood (12 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 3.9 kg/kkg of seafood (3.9 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 1.2 kg/kkg of seafood (1.2 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 0.42 kg/kkg of seafood (0.42 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.63 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 7.8 kg/kkg of seafood (7.8 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 3.1 kg/kkg of seafood (3.1 lb/1,000 lb).
TSS	Maximum for any 1 day: 2.5 kg/kkg of seafood (2.5 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.99 kg/kkg of seafood (0.99 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.22 kg/kkg of seafood (0.22 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.072 kg/kkg of seafood (0.072 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.64 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 15 kg/kkg of seafood (15 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 5.1 kg/kkg of seafood (5.1 lb/1,000 lb).
TSS	Maximum for any 1 day: 9.9 kg/kkg of seafood (9.9 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 3.3 kg/kkg of seafood (3.3 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 1.1 kg/kkg of seafood (1.1 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.36 kg/kkg of seafood (0.36 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.65 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the Alaskan whole crab and crab section subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of of this section, § 128.133 of this title shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.64, 40 CFR Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart G—Dungeness and Tanner Crab Processing in the Contiguous States Subcategory

§ 408.70 Applicability; description of the dungeness and tanner crab processing in the contiguous States subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of dungeness and tanner crab in the contiguous States.

§ 408.71 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Waste," 1971. Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.72 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 12 kg/kkg of seafood (12 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 4.8 kg/kkg of seafood (4.8 lb/1,000 lb).
TSS	Maximum for any 1 day: 2.0 kg/kkg of seafood (2.0 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.81 kg/kkg of seafood (0.81 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.30 kg/kkg of seafood (0.30 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.12 kg/kkg of seafood (0.12 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.73 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 1.8 kg/kkg of seafood (1.8 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.92 kg/kkg of seafood (0.92 lb/1,000 lb).
TSS	Maximum for any 1 day: 4.6 kg/kkg of seafood (4.6 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 2.3 kg/kkg of seafood (2.3 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.11 kg/kkg of seafood (0.11 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.057 kg/kkg of seafood (0.057 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.74 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 10 kg/kkg of seafood (10 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 4.1 kg/kkg of seafood (4.1 lb/1,000 lb).
TSS	Maximum for any 1 day: 1.7 kg/kkg of seafood (1.7 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.69 kg/kkg of seafood (0.69 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.14 kg/kkg of seafood (0.14 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.057 kg/kkg of seafood (0.057 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.75 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the dungeness and tanner crab processing in the contiguous States subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.74, 40 CFR, Part 408 provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart H—Alaskan Shrimp Processing Subcategory

§ 408.80 Applicability; description of the Alaskan shrimp processing subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of shrimp in Alaska.

§ 408.81 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Waste," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended nonfilterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1,000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.82 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants pollutant properties which may be discharged after application of the best practicable control technology currently achievable by a point source subject to provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 560 kg/kkg of seafood (560 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 120 kkg of seafood (56 lb/ kg/kkg of seafood (120 lb/1,000 lb).
TSS	Maximum for any 1 day: 520 kg/kkg of seafood (520 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 210 kg/kkg of seafood (210 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: kg/kkg of seafood (5.5 lb/ lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 18 kg/kkg of seafood (18 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.83 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 160 kg/kkg of seafood (160 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 64 kg/kkg of seafood (64 lb/1,000 lb).
TSS	Maximum for any 1 day: 140 kg/kkg of seafood (140 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 56 kg/kkg of seafood (56 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 5.5 kg/kkg of seafood (5.5 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 2.2 kg/kkg of seafood (2.2 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.84 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 300 kg/kkg of seafood (300 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 100 kg/kkg of seafood (100 lb/1,000 lb).
TSS	Maximum for any 1 day: 270 kg/kkg of seafood (270 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 180 kg/kkg of seafood (180 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 22 kg/kkg of seafood (22 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 11 kg/kkg of seafood (11 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.85 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the Alaskan shrimp processing subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.84, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart I—Northern Shrimp Processing of More Than 1816 kg (4000 lbs) of Raw Material Per Day in the Contiguous States Subcategory

§ 408.90 Applicability; description of the Northern shrimp processing of more than 1816 kg (4000 lbs) of raw material per day in the contiguous States subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of shrimp in the Northern contiguous States; including Washington, Oregon, California, Maine, New Hampshire, and Massachusetts. The effluent limitations contained in subpart I are applicable to facilities which process more than 1816 kg (4000 lbs) of raw material per day on any day during a calendar year.

§ 408.91 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method describing in "Methods for Chemical Analysis of Water and Waste," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.92 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 100 kg/kkg of seafood (100 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 70 kg/kkg of seafood (70 lb/1,000 lb).
TSS	Maximum for any 1 day: 40 kg/kkg of seafood (40 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 16 kg/kkg of seafood (16 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 16 kg/kkg of seafood (16 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 6.3 kg/kkg of seafood (6.3 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.93 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 7.6 kg/kkg of seafood (7.6 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 3.8 kg/kkg of seafood (3.8 lb/1,000 lb).
TSS	Maximum for any 1 day: 19 kg/kkg of seafood (19 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 9.6 kg/kkg of seafood (9.6 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.48 kg/kkg of seafood (0.48 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.24 kg/kkg of seafood (0.24 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.94 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 155 kg/kkg of seafood (155 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 62 kg/kkg of seafood (62 lb/1,000 lb).
TSS	Maximum for any 1 day: 38 kg/kkg of seafood (38 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 15 kg/kkg of seafood (15 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 14 kg/kkg of seafood (14 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 5.7 kg/kkg of seafood (5.7 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.95 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the Northern shrimp processing of more than 1816 kg (4000 lbs) of raw material per day in the contiguous States subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.94, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart J—Northern Shrimp Processing of 1816 kg (4000 lbs) or Less of Raw Material Per Day in the Contiguous States Subcategory

§ 408.100 Applicability; description of the Northern shrimp processing of 1816 kg (4,000 lbs) or less of raw material per day in the contiguous States subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of shrimp in the Northern contiguous States, including Washington, Oregon, California, Maine, New Hampshire, and Massachusetts. The effluent limitations contained in Subpart J are applicable to facilities which process 1816 kg (4000 lbs) or less of raw material per day.

§ 408.101 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical

Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(b) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.102 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 360 kg/kkg of seafood (360 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 190 kg/kkg of seafood (190 lb/1,000 lb).
TSS	Maximum for any 1 day: 160 kg/kkg of seafood (160 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 84 kg/kkg of seafood (84 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 96 kg/kkg of seafood (96 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 38 kg/kkg of seafood (38 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.103 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 155 kg/kkg of seafood (155 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 62 kg/kkg of seafood (62 lb/1,000 lb).
TSS	Maximum for any 1 day: 38 kg/kkg of seafood (38 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 15 kg/kkg of seafood (15 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 14 kg/kkg of seafood (14 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 5.7 kg/kkg of seafood (5.7 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.104 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 155 kg/kkg of seafood (155 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 62 kg/kkg of seafood (62 lb/1,000 lb).
TSS	Maximum for any 1 day: 38 kg/kkg of seafood (38 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 15 kg/kkg of seafood (15 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 14 kg/kkg of seafood (14 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 5.7 kg/kkg of seafood (5.7 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.105 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the Northern shrimp processing of 1816 kg (4000 lbs) or less of raw material per day in the contiguous States subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.104, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart K—Southern Non-Breaded Shrimp Processing of More Than 1816 kg (4000 lbs) of Raw Material Per Day in the Contiguous States Subcategory

§ 408.110 Applicability; description of the Southern non-breaded shrimp processing of more than 1816 kg (4000 lbs) of raw material per day in the contiguous States subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of non-breaded shrimp in the Southern contiguous States, including North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. The effluent limitations contained in Subpart K are applicable to facilities which process more than 1816 kg (4000 lbs) of raw material per day on any day during a calendar year.

§ 408.111 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amendable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.112 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 70 kg/kkg of seafood (70 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 28 kg/kkg of seafood (28 lb/1,000 lb).

Effluent characteristic	*Effluent limitation*
TSS	Maximum for any 1 day: 38 kg/kkg of seafood (38 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 11 kg/kkg of seafood (11 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 4.5 kg/kkg of seafood (4.5 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 1.8 kg/kkg of seafood (1.8 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.113 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 6.0 kg/kkg of seafood (6.0 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 3.0 kg/kkg of seafood (3.0 lb/1,000 lb).
TSS	Maximum for any 1 day: 15 kg/kkg of seafood (15 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 7.6 kg/kkg of seafood (7.6 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.38 kg/kkg of seafood (0.38 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.19 kg/kkg of seafood (0.19 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.114 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 63 kg/kkg of seafood (63 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 25 kg/kkg of seafood (25 lb/1,000 lb).
TSS	Maximum for any 1 day: 28 kg/kkg of seafood (28 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 10 kg/kkg of seafood (10 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 4.0 kg/kkg of seafood (4.0 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 1.6 kg/kkg of seafood (1.6 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.115 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the Southern non-breaded shrimp processing of more than 1816 kg (4000 lbs) of raw material per day in the contiguous States subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title except that for the purposes of this section, § 128.133 of this title shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.114, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart L—Southern Non-Breaded Shrimp Processing 1816 kg (4000 lbs) or Less of Raw Material Per Day in the Contiguous States Subcategory

§ 408.120 Applicability; description of the Southern non-breaded shrimp processing of 1816 kg (4000 lbs) or less of raw material per day in the contiguous States subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of non-breaded shrimp in the Southern contiguous States, including North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. The effluent limitations contained in Subpart L are applicable to facilities which process 1816 kg (4000 lbs) or less of raw material per day.

§ 408.121 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes", 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.122 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 140 kg/kkg of seafood (140 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 46 kg/kkg of seafood (46 lb/1,000 lb).
TSS	Maximum for any 1 day: 110 kg/kkg of seafood (110 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 38 kg/kkg of seafood (38 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 37 kg/kkg of seafood (37 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 9 kg/kkg of seafood (9 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.123 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 68 kg/kkg of seafood (68 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 26 kg/kkg of seafood (26 lb/1,000 lb).
TSS	Maximum for any 1 day: 28 kg/kkg of seafood (28 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 10 kg/kkg of seafood (10 lb/1,000 lb).

Effluent characteristic	*Effluent limitation*
Oil and grease.	Maximum for any 1 day: 4.0 kg/kkg of seafood (4.0 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 1.6 kg/kkg of seafood (1.6 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.124 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 65 kg/kkg of seafood (65 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 26 kg/kkg of seafood (26 lb/1,000 lb).
TSS	Maximum for any 1 day: 25 kg/kkg of seafood (25 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 10 kg/kkg of seafood (10 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 4 kg/kkg of seafood (4 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 1.6 kg/kkg of seafood (1.6 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.125 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the act, for a source within the Southern non-breaded shrimp processing of 1816 kg (4000 lbs) or less of raw material per day in the contiguous States subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.124, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart M—Breaded Shrimp Processing of More Than 1816 kg (4000 lbs) of Raw Material Per Day in the Contiguous States Subcategory

§ 408.130 Applicability; description of the breaded shrimp processing of more than 1816 kg (4000 lbs) of raw material per day in the contiguous States subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of breaded shrimp in the contiguous States facilities which process more than 1816 kg (4000 lbs) of raw material per day on any day during a calendar year.

§ 408.131 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.132 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5..........	Maximum for any 1 day: 125 kg/kkg of seafood (125 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 50 kg/kkg of seafood (50 lb/1,000 lb).
TSS...........	Maximum for any 1 day: 70 kg/kkg of seafood (70 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 28 kg/kkg of seafood (28 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 4.5 kg/kkg of seafood (4.5 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 1.8 kg/kkg of seafood (1.8 lb/1,000 lb).
pH............	Within the range of 6.0 to 9.0.

§ 408.133 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 9.2 kg/kkg of seafood (9.2 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 4.6 kg/kkg of seafood (4.6 lb/1,000 lb).
TSS	Maximum for any 1 day: 24 kg/kkg of seafood (24 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 12 kg/kkg of seafood (12 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.58 kg/kkg of seafood (0.58 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.29 kg/kkg of seafood (0.29 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.134 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstarted control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5.........	Maximum for any 1 day: 100 kg/kkg of seafood (100 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 40 kg/kkg of seafood (40 lb/1,000 lb).

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Effluent characteristic	*Effluent limitation*
TSS	Maximum for any 1 day: 55 kg/kkg of seafood (55 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 22 kg/kkg of seafood (22 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 3.8 kg/kkg of seafood (3.8 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 1.5 kg/kkg of seafood (1.5 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.135 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the breaded shrimp processing of more than 1816 kg (4000 lbs) of raw material per day in the contiguous States subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.134, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart N—Breaded Shrimp Processing of 1816 kg (4000 lbs) or Less of Raw Material Per Day in the Contiguous States Subcategory

§ 408.140 Applicability; description of the breaded shrimp processing of 1816 kg (4000 lbs) or less of raw material per day in the contiguous States subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of breaded shrimp in the contiguous States by facilities which process 1816 kg (4000 lbs) or less of raw material per day.

§ 408.141 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall mean 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.142 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 250 kg/kkg of seafood (250 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 84 kg/kkg of seafood (84 lb/1,000 lb).
TSS	Maximum for any 1 day: 280 kg/kkg of seafood (280 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 98 kg/kkg of seafood (98 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 27 kg/kkg of seafood (27 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 9 kg/kkg of seafood (9 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.143 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 100 kg/kkg of seafood (100 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 40 kg/kkg of seafood (40 lb/1,000 lb).
TSS	Maximum for any 1 day: 55 kg/kkg of seafood (55 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 22 kg/kkg of seafood (22 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 3.8 kg/kkg of seafood (3.8 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 1.5 kg/kkg of seafood (1.5 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.144 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 100 kg/kkg of seafood (100 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 40 kg/kkg of seafood (40 lb/1,000 lb).
TSS	Maximum for any 1 day: 55 kg/kkg of seafood (55 lb/1,000 lb).
	Maximum average of daily values for any period of 30 consecutive days: 22 kg/kkg of seafood (22 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 3.8 kg/kkg of seafood (3.8 lb/1,00 lb).
	Maximum average of daily values for any period of 30 consecutive days: 1.5 kg/kkg of seafood (1.5 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.145 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the breaded shrimp processing of 1816 kg (4000 lbs) or less of raw material per day in the contiguous States subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.144, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified per-

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centage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart O—Tuna Processing Subcategory

§ 408.150 Applicability; description of the tuna processing subcategory.

The provisions of this subpart are applicable to discharges of process waste water pollutants from the processing of tuna.

§ 408.151 Specialized definitions.

For the purpose of this subpart:

(a) The term "oil and grease" shall mean those components of a waste water amenable to measurement by the method described in "Methods for Chemical Analysis of Water and Wastes," 1971, Environmental Protection Agency, Analytical Quality Control Laboratory, page 217.

(b) The term "seafood" shall mean the raw material, including freshwater and saltwater fish and shellfish, to be processed, in the form in which it is received at the processing plant.

(c) The following abbreviations shall have the following meanings: (1) "BOD5" shall mean 5-day biochemical oxygen demand, (2) "TSS" shall mean total suspended non-filterable solids, (3) "kg" shall mean kilogram(s), (4) "kkg" shall means 1000 kilograms, and (5) "lb" shall mean pound(s).

§ 408.152 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by a point source subject to the provision of this subpart:

Effluent Characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 20 kg/kkg of seafood (20 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 7.8 kg/kkg of seafood (7.8 lb/1,000 lb).
TSS	Maximum for any 1 day: 7.5 kg/kkg of seafood (7.5 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 3.0 kg/kkg of seafood (3.0 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 2.2 kg/kkg of seafood (2.2 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.87 kg/kkg of seafood (0.87 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.153 Effluent limitations guidelines representing the degree of effluent reduction obtainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart;

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 1.2 kg/kkg of seafood (1.2 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.31 kg/kkg of seafood (0.31 lb/1,000 lb).
TSS	Maximum for any 1 day: 1.6 kg/kkg of seafood (1.6 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.31 kg/kkg of seafood (0.31 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 0.22 kg/kkg of seafood (0.22 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days 0.064 kg/kkg of seafood (0.064 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.154 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
BOD5	Maximum for any 1 day: 18 kg/kkg of seafood (18 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 7.0 kg/kkg of seafood (7.0 lb/1,000 lb).
TSS	Maximum for any 1 day: 6.8 kg/kkg of seafood (6.8 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 2.7 kg/kkg of seafood (2.7 lb/1,000 lb).
Oil and grease.	Maximum for any 1 day: 2.0 kg/kkg of seafood (2.0 lb/1,000 lb). Maximum average of daily values for any period of 30 consecutive days: 0.78 kg/kkg of seafood (0.78 lb/1,000 lb).
pH	Within the range of 6.0 to 9.0.

§ 408.155 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the tuna processing subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title; except that for the purposes of this section, § 128.133 of this title shall be amended to read as follows:

"In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 408.154, 40 CFR, Part 408, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

[FR Doc.74-2881 Filed 2-5-74;8:45 am]

APPENDIX D

VIBRIO STUDIES

Vibrio species as indicators of pollution from seafood processing wastes have received very little attention in water quality surveys. *V. parahaemolyticus* is pathogenic to man. In Japan, where seafood is eaten raw, it is the major bacterial cause of epidemic gastroenteritis, accounting for 40 to 50 percent of the food-borne infections.[1,2] In the United States, *V. parahaemolyticus* has been implicated in unconfirmed and confirmed outbreaks of food-borne illnesses associated with consumption of seafood. Between August 1969 and October 1972, there were eight separately confirmed outbreaks of vibriosis and five unconfirmed episodes of this disease.[3] Additionally, some strains may cause localized tissue infections in humans.[4]

V. parahaemolyticus and other vibrios have been found to be associated with moribund crab, numerous types of diseased fish, clams, oysters, shrimp and eels.[5,6,7,8,9,10] Vibrios are also known to occur in high densities in marina environments which contain chitinous materials such as exoskeletons of marine life.[11]

Because of the limited use of this parameter in the past, no restrictive limits have been placed on *Vibrio* species as an indicator of a health hazard to either man or marine commercial species. Restrictions for *V. parahaemolyticus* densities imposed by the U. S. Food and Drug Administration on marketable seafood products are forthcoming. These criteria will be concerned only with the health hazards resulting from consumption of contaminated seafood. The adverse effects on marine commercial species is another matter entirely. Establishment of a criterion in this area will require much more information on the ecology, distribution and role of these microorganisms in the marine environment. It is logical to predict that high densities of these organisms in a particular area would impose a threat to marine commercial species. To date there is no information in the literature on the densities of *Vibrio* that would endanger marine life. However, conditions that caused the bacteria to be concentrated in the hundreds of thousands per 100 ml in water or sediment would, no doubt, be hazardous and grounds for abatement procedures.

Vibrio densities below one thousand per 100 ml in water or sediment would be considered doubtful as a possible threat to marine commercial species. Therefore, no attempt is made to apply a definite limit as standard to *Vibrio* species. At this time, and until additional data become available, speculation regarding the levels of concern of *Vibrio* species constituting hazardous conditions becomes a matter of common sense and conjecture.

This investigation was initiated to determine if vibrios were associated with the wastes and surrounding marine environment adjacent to seafood processing plants in Southeastern Alaska, and to ascertain if a hazard to marine commercial species may result from these processes.

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APPENDIX E

MATERIALS AND METHODS

RECEIVING WATER QUALITY DATA

Water quality was determined at stations established on the basis of general water movement and the points of discharge of cannery wastes. At each station the following parameters were measured: dissolved oxygen content, temperature, salinity, transparency, and pH.

Water samples were taken at each station from near the surface and bottom during high slack and low slack water. In localities where low tides exposed extensive mud flats sampling was limited to only high slack water. In instances of considerable depths (e.g. Chatham - 60 meters) the deeper samples were obtained from standard depths of 30 meters. At least one or two stations at each cannery site were selected to serve as controls.

Water samples for dissolved oxygen determinations were collected with a Van Dorn sampler, transferred to standard 300 ml BOD bottles and chemically fixed in the field. Upon completion of the field sampling DO measurements were made by the azide modification of the Winkler method.[1/]

Temperature of the water sample from near the bottom was determined immediately when it reached the surface. Surface water temperature was obtained from a grab sample. A bimetallic dial thermometer with a 0.5 percent accuracy over full range was used during the entire survey.

Salinity measurements were made at all water quality stations with hydrometers, calibrated to National Bureau of Standards (NBS) requirements.

The majority of pH measurements were obtained with a pH kit, having an accuracy of ± 0.50 standard units. However, on the Alaska Peninsula pH was measured with a pH meter accurate within ± 0.10 standard units.

Transparency of the water was determined using a standard 20 cm diameter Secchi disc.

A series of sediment samples were obtained at each cannery using either a Peterson or "snapper" grab to ascertain the distribution pattern of solid wastes from the seafood processing operations and the resulting carbon/nitrogen ratio of the sediments [Figure 1].[2/] The carbon/nitrogen ratio was used to compute an "organic sediment index" (OSI) that reflects the amount of decomposable organic material present in the sediment. OSI values from 0.0 to 0.5 indicate inorganic or stable organic materials; between 0.5 and 1 indicate sediment containing partially stabilized material; between 1 and 5 indicate decomposing materials; and values above 5 indicate extremely active decomposition [Figure 2].[2/]

The samples were first dried at 50°C for approximately 16 hr, then ground with a mortar and pestle to pass a Tyler #40 sieve. For the organic carbon analysis, triplicate aliquots of each sieved sample were accurately weighed on a Cahn G-2 electrobalance and transferred to a glass ampule. The digestion reagents, 0.25 ml of 6 percent H_3PO_4 and 0.2g of $K_2S_2O_8$, were then added to each ampule and the volume of the mixture was made up to 10 ml with distilled water. After purging with oxygen to remove the inorganic carbon components, the ampules were

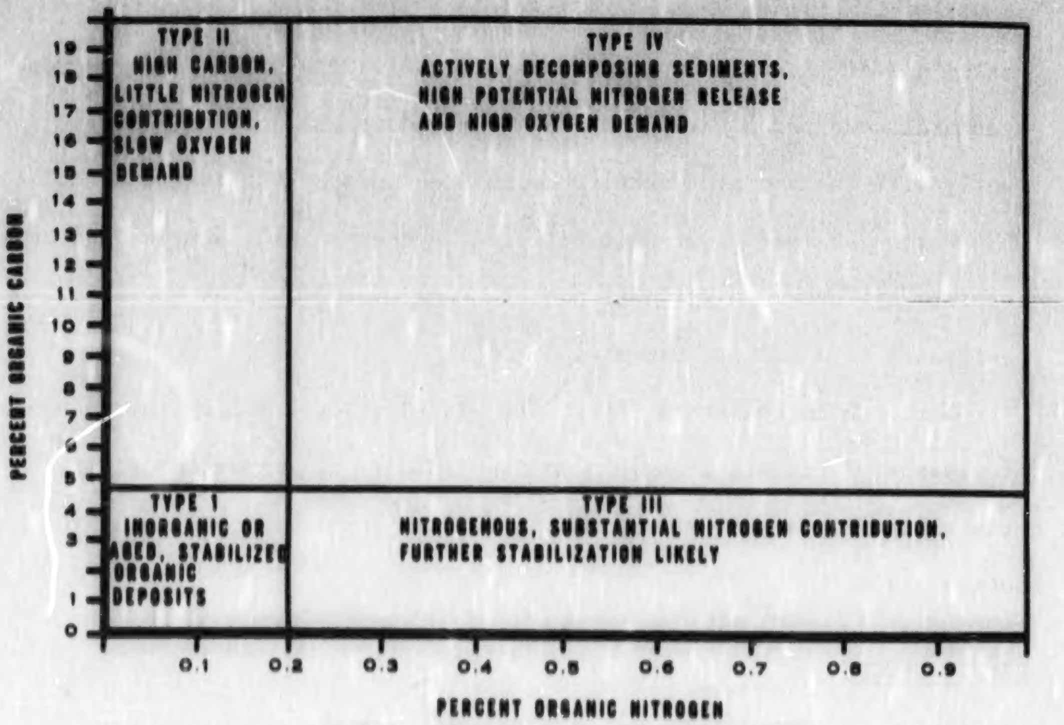

Figure 1. Bottom Sediment Classification

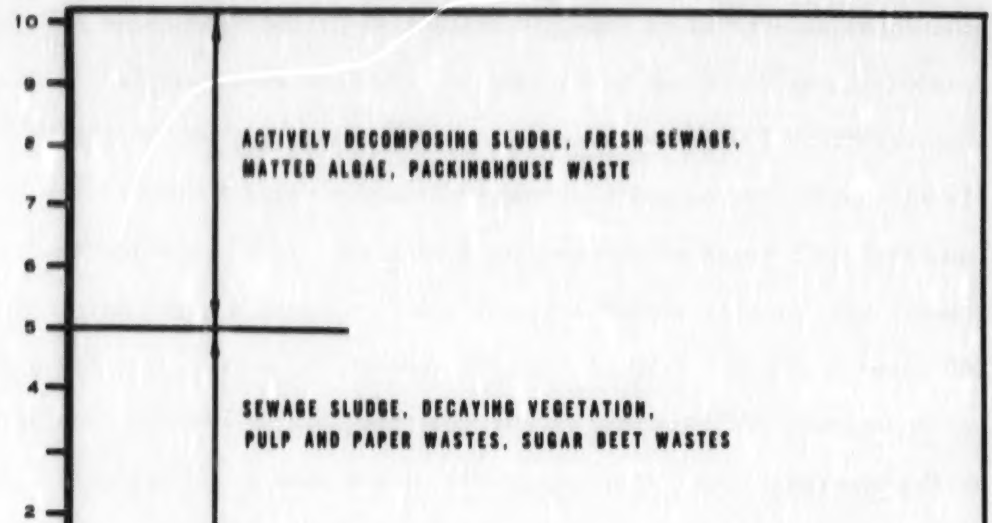

Figure 2. Organic Sediment Index for Typical Bottom Deposits

sealed and digested in an autoclave for 12 hr. Distilled water sucrose standards were taken through the same procedure and analyzed concurrently with the sediment samples on an Oceanography International Model 0524 Carbon Analyzer. Organic nitrogen in the sediment samples was determined by the micro Kjeldahl procedure after the samples had been pretreated to eliminate ammonia.

Although no concerted effort was placed on determining the presence or absence of benthic organisms in the vicinity of canneries, visual observations were made of exposed intertidal zones and occasional bottom grabs.

BACTERIOLOGY

Sampling

All water and wastewater samples were collected according to procedures prescribed in the 13th edition of "Standard Methods for the Examination of Water and Wastewater."[2/] Seafood waste samples (approximately 200 grams) were collected in sterile 6 oz "Whirlpak"^{tm} plastic bags. Bottom sediments were collected using a Peterson or "snapper" grab which was thoroughly rinsed and air dried prior to resampling. Sterile tongue depressors were used to scrape approximately 200 grams of the top 0.50 to 1.0 cm of mud which was asceptically placed in the sterile plastic bags. Where possible, bottom samples consisting of the uppermost layer (0.5 to 1.0 cm) of mud were collected at the intertidal zone. Background samples of water and sediment were collected from remote areas uninfluenced by seafood processing operations. Coliform and *Vibrio* samples were collected during low slack tides.

Sample Storage and Handling

Samples for coliform determinations were stored in ice chests containing "slush ice" and were held at less than 5°C until analyses. Vibrio samples were held until analyses in styrofoam insulated containers, which retained their original temperature within 1.0°C. All samples were analyzed within 6 to 8 hr after collection.

Culture

Cultures of V. parahaemolyticus, V. alginolyticus and V. anguillarium used for control purposes were furnished by R. R. Colwell, University of Maryland; Morris Fishbein, U. S. Food and Drug Administration; and R. E. Weaver, National Center for Disease Control.

Isolation Procedures

Total and fecal coliform analyses were performed using the five-tube Most Probable Number technique (MPN).[2/]

Samples for Vibrio analyses were prepared by blending 50 gram portions of sediment or seafood waste with 450 ml (1:10) of sterile saline solution for one minute at 8,000 rpm. A three-tube MPN series was prepared according to procedures described in the Bacteriological Analytical Manual[3/] by innoculating three 10 ml portions of the 1:10 dilution into three tubes containing 10 ml each of double strength glucose-salt-teepol broth (GSTB). Additional decimal dilutions were innoculated into appropriate banks of three tubes of single strength GSTB. After 20 to 24 hr incubation at 35°C, all GSTB tubes were streaked onto duplicate plates of thiosulfate-citrate-bile salts-sucrose agar (TCBS). Colonies suspected to be Vibrio were innoculated into triple sugar iron agar (TSI) and motility media, each containing 3 percent NaCl. TSI reactions showing acid-butt alkaline or acid slant, negative gas, negative H_2S and positive motility were subjected to cytochrome oxidase testing using Pathotec^{tm} strips. If cultures were oxidase negative, biochemical testing was terminated; if they were oxidase positive, cultures were further tested biochemically (as described below) for confirmation of Vibrio.

For water samples the above procedure was performed as described except that 10 ml of sample was used as the maximum volume of the three-tube MPN series.

Confirmation of Vibrio

All suspect isolates that conformed to the screening procedures described above were tested for the following biochemical patterns.

V. parahaemolyticus = (-) arginine dihydrolase, (+) lysine decarboxylase, (-) methyl red, (-) Voges-Proskauer, (-) indole, acid formation in glucose both aerobically and anaerobically, (-) cellobiose, (-) sucrose, (+) maltose, (+) mannitol, (+) trehalose, [(±) growth in broth containing 0% NaCl, (+) 6% NaCl, (+) 8% NaCl, (-) 10% NaCl], (+) growth at 42°C, pleomorphic, Gram-negative bacilli.

V. alginolyticus = (-) arginine dihydrolase, (+) lysine decarboxylase, (+) Voges-Proskauer, (-) methyl red, (+) indole, acid formation in glucose both aerobically and anaerobically, (-) cellobiose, (+) sucrose, (+) maltose, (-) mannitol, (+) trehalose [(-) growth in broth containing 0% NaCl, (+) 6% NaCl, (+) 8% NaCl, (+) 10% NaCl]; (+) growth at 42°C, pleomorphic, Gram-negative bacilli.

REFERENCES

1. Standard Methods For the Examination of Water and Wastewater, American Public Health Association, 13th Ed. New York, 1971.

2. Ballinger, D. G. and G. D. McKee, "Chemical Characterization of Bottom Sediments," Journ. of Water Pollution Control Federation, Vol. 43, No. 2., Feb. 1971.

3. Bacteriological Analytical Manual, Department of Health, Education and Welfare, 3rd Ed., Division of Microbiology, Food and Drug Administration, Washington, D.C., May, 1972.